H-90-09

SOUTHWEST FISHERIES CENTER
NATIONAL MARINE FISHERIES SERVICE
2570 DOLE STREET
HONOLULU, HAWAII 96822-2396

May 1990

FISHERY STATISTICS OF THE WESTERN PACIFIC, VOLUME V

Territory of American Samoa (1988)

Commonwealth of the Northern Mariana Islands (1988)

Territory of Guam (1988)

State of Hawaii (1988)

Compiled by

David C. Hamm, Michael M. C. Quach, Robert S. Antonio, and John J. Czyz

Southwest Fisheries Center Honolulu Laboratory
National Marine Fisheries Service, NOAA
Honolulu, Hawaii 96822-2396

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ADMINISTRATIVE REPORT H-90-09

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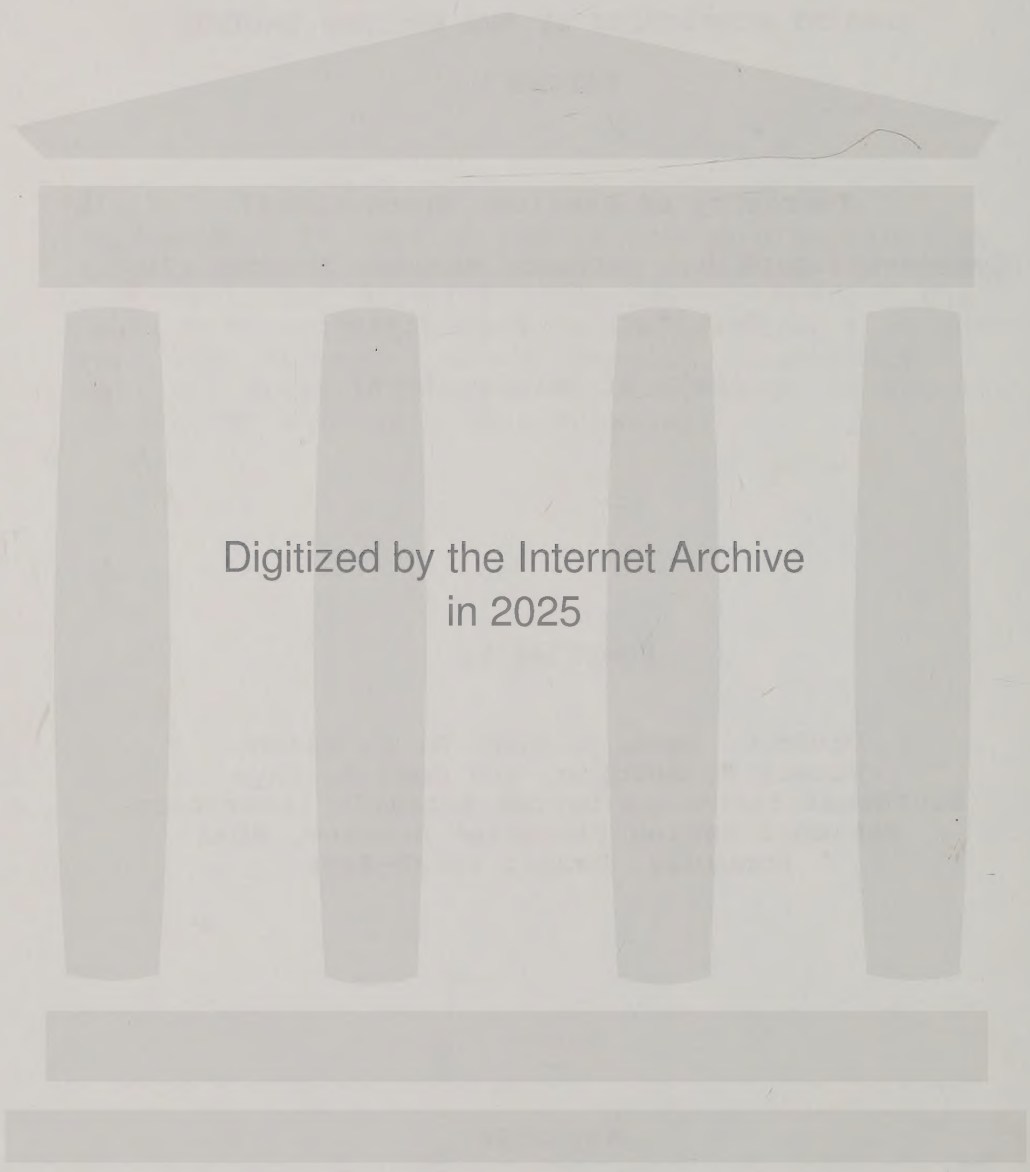

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PREFACE

In recent years, the demand for data and information concerning marine fisheries has greatly increased. To help meet these increased needs in the central and western Pacific areas, the National Marine Fisheries Service's Southwest Fisheries Center initiated the Western Pacific Fishery Information Network (WPACFIN), which assists Pacific island fisheries agencies in upgrading their data collecting, processing, and reporting capabilities. Several agencies are participating in this program: the National Marine Fisheries Service's Southwest Fisheries Center and its Honolulu Laboratory, and the Southwest Region and its Western Pacific Program Office, American Samoa's Department of Marine and Wildlife Resources, the Commonwealth of the Northern Mariana Islands' Division of Fish and Wildlife, Guam's Division of Aquatic and Wildlife Resources, Hawaii's Division of Aquatic Resources, and the Western Pacific Regional Fishery Management Council.

In 1982, these agencies formed a Fisheries Data Coordinating Committee (FDCC) and a FDCC Technical Subcommittee to help guide, coordinate, and monitor all of the many activities being undertaken by each agency to improve their systems. Significant progress has been made by all participating agencies, particularly in the areas of upgrading data collecting and processing systems.

As a major step in improving and coordinating the data reporting and distributing systems of the agencies, in May 1985, the FDCC agreed to begin producing a combined document reporting each island's major fisheries statistics. Production of the document would be the responsibility of the FDCC Technical Subcommittee and would be coordinated by the WPACFIN program manager. Each agency would supply required summaries, graphs, and text for its respective chapter of the report; WPACFIN would combine the chapters and distribute the document as part of the Administrative Report Series of the Southwest Fisheries Center.

This document is the fifth volume in the series "Fishery Statistics of the Western Pacific" and contains summaries of commercial and creel survey fishery landings data for 1988 for American Samoa, the Commonwealth of the Northern Mariana Islands, Guam, and Hawaii. The first four volumes of this series contained similar reports for these areas for 1979 through 1987.

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BACKGROUND

This report has been compiled by governmental fisheries agencies of several islands in the central and western Pacific area in a cooperative and continuing effort to improve the availability and dissemination of fisheries information. The data contained herein have been collected, computerized, edited, and processed by agencies participating in the Western Pacific Fishery Information Network (WPACFIN), including American Samoa's Department of Marine and Wildlife Resources (DMWR), the Commonwealth of the Northern Mariana Islands' (CNMI) Division of Fish and Wildlife (DFW), Guam's Division of Aquatic and Wildlife Resources (DAWR), Hawaii's Division of Aquatic Resources (HDAR) and the Southwest Fisheries Center's (SWFC) Honolulu Laboratory, National Marine Fisheries Service (NMFS). The data summaries and graphs contained in this document were prepared by WPACFIN staff at the Honolulu Laboratory from data collected by WPACFIN or provided by these agencies. Data from DMWR, DFW, and DAWR were supplied on floppy diskettes in established WPACFIN data base formats, whereas data on the Guam commercial fisheries were collected on forms provided to fish wholesalers by WPACFIN. Data for Hawaii were provided by HDAR on computer tape. Once data from all of these agencies were put into the proper format on the central WPACFIN computer and appropriate edit and verification procedures completed, summary reports and files were produced using software developed specifically for this purpose. Graphs were produced using commercially available software and a lazerjet printer.

PROGRESS

In 1981, when WPACFIN began assisting agencies in improving their data collecting and processing systems, only the State of Hawaii had computerized processing. By mid-1982, fisheries offices in American Samoa, Guam, and the CNMI had implemented computerized processing on microcomputers supplied by WPACFIN. Since that time, these agencies have made many significant improvements to their data collecting systems and have established sound automated data processing systems. Most agencies can now provide fishery statistics to WPACFIN within 45 days of the date of collection. The HDAR has also improved its systems in recent years and has significantly reduced the lag time in data processing from about 2.5 years to less than 1 year. It has also improved the procedures used for editing, updating, and processing Hawaii's data. Implementation of additional planned improvements could reduce the lag time to about 6 months.

PRECAUTIONS

Data collecting and processing systems vary greatly among Pacific island fisheries agencies. Although much standardization has taken place and is continuing, there remain many unique aspects of each island's systems based on local needs and capabilities. When using summaries contained in this report, especially if making comparisons, one should keep in mind the nature of the systems used to produce the data. For instance, Hawaii's data are based on mandatory monthly reporting by licensed commercial fishermen, CNMI's data are based on voluntary monthly reporting of fish buyers using government- provided invoices, Guam's data are from WPACFIN-sponsored voluntary reporting by major commercial dealers and DAWR- operated creel survey sampling and data expansion programs, and American Samoa's data are based on an integration of almost daily interviews of fishermen and a creel survey and data expansion program similar to Guam's. Each system has advantages and disadvantages, and the user should be aware of them when comparing or interpreting data.

The user should also be aware that species assemblages vary among island groups, as do cultural preferences and principal fishing techniques. Population size is of particular importance when making interpretations of the relative value and importance of the fisheries. To help the user make these value judgments, more detailed explanations of the data collecting and processing systems are provided in each island's section of this report.

CONTENTS

This document is divided into sections by island group. Each section contains reports on the monthly and annual landings by species or species groups for the commercial fleet. The sections for American Samoa and Guam also contain estimates of total catch and effort of all fisheries including recreational and subsistence fishing activities. These estimates and their associated confidence limits were generated by computer-based data expansion systems using sample fishery data collected by creel survey programs. Commercial landings for American Samoa were calculated based on information gathered during the offshore creel survey sampling program. Two sets of annual summaries are included for Hawaii, one each for commercial landings that were sold and not sold.

Definitions

In addition to the description of the systems and the monthly and annual reports, each section contains graphs of some of the summary fishery statistics of particular interest or importance to participating WPACFIN agencies. For purposes of graphical presentation of the data, several categories have been defined for each island's fisheries. Because of differences in

reporting systems and capabilities among the islands, species contained within each category may vary, but all categories are documented in each island's section. Overlap exists among some of the categories used for different graphs. Categories used in the graphs include the following:

1. Fisheries Categories - These are combinations of species of similar ecological types, specifically, pelagic, bottom fish, reef fish, and "other." "Other" includes groups that generally traverse these categories, such as sharks and certain jacks, or are not typically included in these groups, such as mullet and milkfish.

2. Pelagic Management Unit Species (PMUS) - Defined in the Fishery Management Plan for pelagic species to include the billfishes, wahoo, mahimahi, and sharks.

3. Bottom Fish Management Unit Species (BMUS) - Defined as the species of initial importance in the Fishery Management Plan for bottom fish and seamount fisheries, including the major deepwater snapper, grouper, emperor, and certain jacks.

4. Tunas - Predominantly skipjack and yellowfin tunas in all areas, but also including most other tuna species and excluding wahoo.

5. Other Tunas - All tunas as defined above, but excluding skipjack and yellowfin tunas.

6. Billfish - Combination of all marlin, sailfish, spearfish, and swordfish species.

7. Other Methods - In the American Samoa and Guam sections, fishing methods other than trolling and bottom fishing are combined into this single "other" category for certain graphs.

Graphics

A minimum of four types of graphs are provided with each island's data. The chapters for American Samoa and Guam have an additional type of graphics on catch and effort from their creel survey data. Type I graphs present summary charts of the major species and species groups for 1988. Type II graphs are seasonality plots for the major species or species groups, showing the average weight landed during each month for all years combined. Type III graphs are based on annual summary statistics and help visualize the variability among years. Type IV graphs are plots of monthly landings of some of the major commercially important species and document fluctuations in landings of these species over the entire time series. Type V graphs are based on creel survey data and include plots of catch and effort by

fishing method plus a combination of several of the types I-IV graphs.

I. Monthly graphs for each year's data including:

- A. Major fisheries categories
- B. Tunas, PMUS, and BMUS
- C. Wahoo, mahimahi, and billfish
- D. Skipjack, yellowfin, and other tunas

II. Plots of average monthly landings for:

- A. Tunas, PMUS, and BMUS
- B. Wahoo and mahimahi
- C. Billfish species:
  1. Marlin and sailfish - American Samoa and CNMI
  2. Blue marlin, black marlin, and striped marlin - Hawaii
  3. Sailfish, shortbill spearfish, and swordfish - Hawaii
- D. Skipjack, yellowfin, and other tunas
- E. BMUS and the most important bottom fish species
  1. BMUS, ehu, and onaga - American Samoa
  2. BMUS, emperor, and grouper - CNMI and Guam
  3. BMUS, onaga, and opakapaka - Hawaii
  4. BMUS, ehu, and uku - Hawaii

III. Graphs of annual summary statistics for:

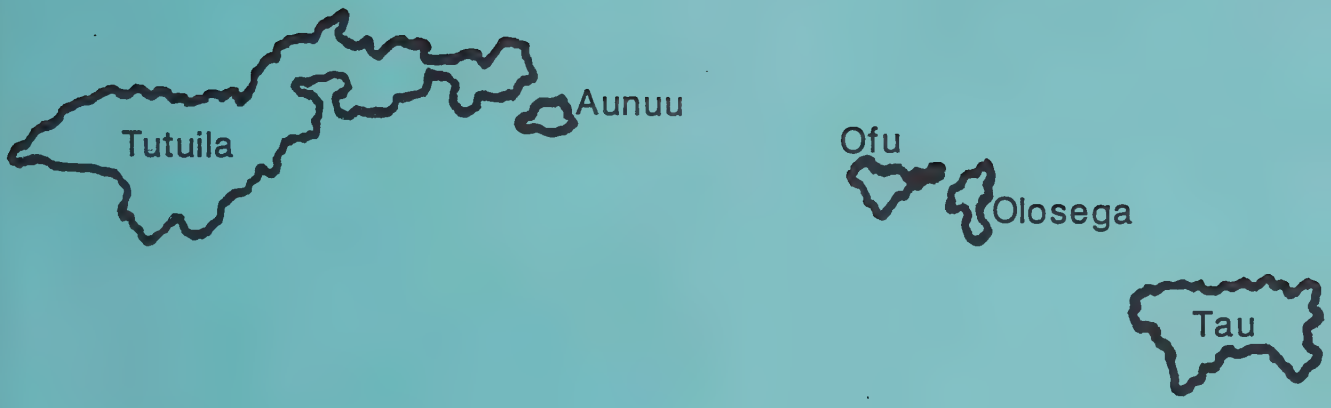
- A. Major fisheries categories
- B. Total commercial landings - pounds and dollars
- C. Tunas, PMUS, and BMUS
- D. Wahoo, mahimahi, and billfish
- E. Skipjack, yellowfin, and other tunas

IV. Graphs of monthly landings over the entire time series for the following major species:

- A. Wahoo - All four areas
- B. Mahimahi - All four areas
- C. Blue marlin - All four areas
- D. Black marlin - Hawaii
- E. Striped marlin - Hawaii
- F. Sailfish - American Samoa, Guam, and Hawaii
- G. Shortbill spearfish - Guam and Hawaii
- H. Swordfish - Hawaii
- I. Skipjack tuna - All four areas
- J. Yellowfin tuna - All four areas
- K. Opakapaka - Hawaii
- L. Onaga - American Samoa and Hawaii
- M. Uku - Hawaii
- N. Ehu - American Samoa and Hawaii
- O. Emperors - CNMI and Guam
- P. Grouper - CNMI and Guam

V. Graphs of certain statistics generated by creel surveys for American Samoa and Guam

A. Offshore monthly catch by method
B. Offshore monthly effort by method
C. Offshore annual catch by method
D. Offshore annual effort by method
E. Inshore Total Catch and Effort
F. Offshore and Inshore Total Catch



American Samoa

Fishery Statistics
1988

AMERICAN SAMOA 1988 FISHERY STATISTICS

Compiled by

American Samoa
Department of Marine and Wildlife Resources
and the
Western Pacific Fishery Information Network

May 1990

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AMERICAN SAMOA 1988 FISHERY STATISTICS

INTRODUCTION

American Samoa (approximately lat. 14° S, long. 170° W) is composed of the major island of Tutuila, where about 87% of the total population of 35,000 live; Aunu'u, a small island less than 1 mile off Tutuila's southeast shore; the Manu'a Islands of Ofu, Olesaga, and Ta'u, located about 105 km (65 miles) east of Tutuila and having about 4,300 residents; the uninhabited Rose Atoll, some 290 km (180 miles) east of Tutuila; and Swain's Island about 350 km (220 miles) north of Tutuila, where approximately 20 people live. The American Samoa Department of Marine and Wildlife Resources (DMWR), formerly the Office of Marine Resources, located in Pago Pago on Tutuila, has been collecting commercial fisheries data from the local fleet on Tutuila since the early 1970's and from the Manu'a Islands since 1983. Most data collected over the years have been from the commercial fleet, but beginning in October 1985, DMWR's data collection programs were modified to include data on recreational and subsistence fisheries as well.

The domestic fisheries of American Samoa are typically small boat, one-day fisheries. Although one domestic longliner operated for a few years, the majority of the fleet is composed of two types of 28- to 29-foot outboard engine powered catamarans called alias and manta cats. During 1988, 34 boats were sampled, 32 from Tutuila and 2 from the Manu'a Islands. Fishing is mostly by trolling and bottom fishing methods, and the majority of the catch is sold locally, but some is exported to Hawaii. During 1988, on average, trips on boats from Tutuila had three-man crews, fished 10 hours, and caught a little over 200 pounds of fish.

DATA COLLECTING SYSTEM

The major method used by DMWR for obtaining catch statistics has always been interviewing fishermen at the end of their trips. Before October 1985, the DMWR data collectors kept records of as much commercial fishing activity as possible and routinely obtained interviews from fishermen as often as possible. This method of data collection provided accurate data on the commercial fleet for the trips where interviews were conducted, but was very labor intensive, did not cover all trips, and intentionally excluded the recreational and subsistence fisheries. Therefore, in October 1985, a new sampling program was implemented on Tutuila to provide better coverage and statistics for all boat-based fisheries. The new sampling methods were not implemented in the Manu'a Islands because the fishing fleet is centrally located and is small enough that statistics were being collected for nearly every trip.

The new sampling program for Tutuila was based on a survey design that had been used in Guam for about 4 years. This systematic, random sampling program stratifies sampling by type of day, either weekday or weekend-holiday. For the new program, DMWR staff normally sample 2 weekdays and 1 weekend-holiday per week. In addition, they obtain as many interviews as possible on their "off days" to maintain as much overall coverage of the fisheries as possible. During official survey days, counts of total participation are collected to facilitate expansion of the survey data to estimates of total catch and effort for Tutuila. Unless contrary information is available, a boat is assumed to be fishing if it is "out," as evidenced by its trailer at a boat ramp or being missing from its normal berthing area. Tutuila is divided into six areas, five of which are sampled. Presumably, fishing activity and success rate of boats in the non-sampled area are similar to those in the sampled areas. Further assumptions are that information given by the fishermen during the interview is accurate and that the fishermen interviewed are representative of the entire fishing population.

Survey data are collected in the field on interview log sheets and returned to the DMWR office for editing. The following information is collected for each interview:

* Date
* Type of day
* Time
* Boat name
  Captain or boat owner's name
* Method of fishing
* Disposition of catch
* Species caught
  Number of pieces for each species
* Weight in pounds for each species
  Price per pound for each species
  Area fished
* Home island
  Number of trips since last interview
* Total trip weight in pounds
  Total hours fished (trip length)
  Number of fishermen
  Number of gear used

It is not always possible for the interviewer to obtain information on all items listed. However, the ones marked with an asterisk (*) are considered essential for data expansion purposes. The "TIME" field is used to distinguish between interviews collected on survey days versus "off days." Only data collected on official survey days are used in the data expansion process. Identification and weight of each species are often not obtainable; in which case, a code for species groupings (e.g., miscellaneous bottom fish) is used.

DATA PROCESSING SYSTEM

Interview forms are returned to the office, edited, coded, and entered into computerized data bases--the commercial landings data base for data collected before October 1985, and the offshore creel survey data base for data collected since then. Edit and summary reports are produced to help verify that the data were entered correctly. The creel survey data bases are then translated into standard record formats to be used by the American Samoa Offshore Expansion System (ASOES), programmed by WPACFIN specifically for DMWR. As data are converted into ASOES formats, additional error checks are performed by the computer to make sure only valid information enters the expansion system. The ASOES is a menu-driven system that steps the user through a series of processes that summarize creel survey data to produce catch and effort expansion and species composition files and reports. Typically 1 month of data is processed at a time, although the system allows for processing broader time increments of data.

The expansion system generates estimates of daily catch, effort, and participation for each fishing method. These daily estimates are considered measurements of the Tutuila fisheries for that day. Average weekday and weekend-holiday estimates and their associated variances or confidence intervals are created from individual daily measurements. These are weighted by the number of each type of day in the month, or other timespan being expanded, and multiplied by proportionality constants that adjust for percent coverage to produce estimates of total catch, effort, and participation along with their confidence intervals. Percent species composition by weight is calculated from the sampled catch and used to create estimates of total landings by species by multiplying the sampled percent by the expanded estimated catch. All steps in the expansion process are stratified by fishing method. The ASOES produces reports and files of the final totals for all important catch and effort statistics. These files are later used to produce the reports contained in this document. On a quarterly basis, copies of the DMWR data bases are sent to the Honolulu Laboratory for updating the central WPACFIN files.

At the Honolulu Laboratory, the data are translated into different formats and transferred to the central computer for further editing, verification, and processing before generation of summary reports. Because DMWR changed their data collecting systems during 1985, new processing procedures were established by WPACFIN to standardize reports as much as possible to facilitate comparisons between years. Data collected before October 1985 were adjusted upward by the percent coverage to account for missed trips. The offshore creel survey data collected since October 1985 were expanded to estimates of total Tutuila landings using ASOES and then separated into commercial versus noncommercial landings (e.g., sold versus not sold). The expansion and separation algorithms stratify the data by fishing

method to improve the final estimates of landings by species. After the file of estimated commercial landings for Tutuila was created from the ASOES files, the adjusted commercial landings for Manu'a were added to it, thereby creating the commercial landings data base for American Samoa. Additionally, because price information was not obtained for all landings that were sold, the commercial data were edited to create price information when none was available. To accomplish this, a three-tiered editing system was designed to "create" price estimates based on the best information available. The edit system puts average price information in each record where it is missing, based on the following three levels of available information:

1. If price information is available for the same species in the same month, the weighted average price per pound is written into all records missing that information for that species and month.

2. If no price information is available for the same species and same month, the annual weighted average price for that species is written into records for that species and month.

3. If no price information is available for a species for the entire year, the program prompts the user for input and updates the file based on the response.

As data base records are updated, each is flagged to indicate which level of estimation was used for the price information. This makes it possible to easily exclude the "created" data, if desired, when doing economic analysis.

DATA REPORTING SYSTEM

After all editing, quality control, and other processing activities are completed on the central WPACFIN computer, monthly and annual commercial landings reports by species are generated. Each of the commercial landings reports contains the common name, weight in pounds, value in dollars, and the average price per pound of each species or species group. Each monthly report contains a subtotal for the sum of all species for that month, and the December report contains the December subtotal and the annual total. Annual reports contain the total estimated commercial landings for each species and for all species combined for the calendar year.

Estimated total landings reports are provided separately for Tutuila and Manu'a. Monthly and annual estimated total landings reports are provided for the Manu'a Islands. Two types of total landings reports are included from the creel survey data expansion system, ASOES, for Tutuila: catch and effort expansion reports and species composition reports. These reports were produced by using the expansion and species composition files

created by ASOES as input to utility programs developed by WPACFIN. The utility programs reorganize, format, and summarize data from ASOES files to improve the presentation of data and reduce the amount of space required to report the important statistics. Monthly and annual estimated total landings reports for 1988 include the expansion summary of catch and effort statistics by fishing method and the summary species composition reports for all methods combined.

Monthly expansion and species composition reports have matching totals for catch by fishing method since the monthly species composition reports are based on the expansion files. Annual expansion and species composition reports also have identical totals because the species reports were generated from the annual expansion files. However, the totals on the annual report will not equal the total obtained by adding all of the monthly files together because the annual expansion reports were generated by re-expanding the entire year's data together, thereby increasing the sample size significantly, and it is hoped, improving the annual estimates of percent species composition and of catch and effort and their associated coefficients of variation (CV's). The annual species composition report was created by calculating annual percentages of species composition by combining all sampling for the year and then multiplying these percentages by the annual expansion totals. This allows calculation of annual percent species composition based on greatly increased sample size.

Computer generated numbers and all totals in the reports are subject to rounding error. All catches are reported in pounds, and effort, in boat hours. In the offshore expansion reports, the boat counts by fishing method will not add to the total boat count when the same boat was used for more than one method on a single trip. In these cases, the boat is included in the count for each method used but included only once in the total count. A CV is included for each statistic in the expansion reports. The CV provides a measurement of the relative variation associated with the estimate preceding it and is calculated by dividing the standard error of the estimate by the estimate and multiplying by 100 and rounding to express the answer as a whole percentage. The larger the CV, the larger the relative variation in the data used to generate the estimate and, therefore, the less precise the estimate. An asterisk following a line means the number of samples collected for that method during that month were insufficient to properly calculate the CV. There must be at least two weekday and two weekend-holiday samples for each method to properly compute a standard error and, therefore, properly compute the CV. If an asterisk is present and the CV is greater than zero, then samples on either weekdays or weekend-holidays were sufficient to compute a standard error for that type of day but not for the other type of day. In this case, the CV provided in the report is for the type of day in which sample information met the minimum requirements for calculating CV. If an asterisk is present and the CV equals zero, then neither type of day had

sufficient number of samples to calculate CV. It follows then, anytime an asterisk is present for any of the fishing methods, the totals for the month are questionable.

In fisheries applications, calculation of catch per unit of effort (CPUE) may be done in several ways. In the ASOES expansion reports, average monthly CPUE is calculated by using the same type of algorithm as for the other expansion elements, and it has an associated CV. First, the average daily CPUE is calculated by dividing the total weight of the fish sampled for a day by the total number of hours fished to produce that catch. Next, the average weekday and weekend-holiday CPUE's are calculated by summing the average daily CPUE's for each type of day and then dividing by the number of survey days for each type of day. These averages are multiplied by the number of weekdays and weekend-holidays, respectively, in that month, then the products are summed and divided by the total number of days in the month to produce the average monthly CPUE for each fishing method. The average monthly CPUE could also be calculated by dividing the estimated monthly catch by the estimated monthly boat hours, but this would provide no indication of the variability of the CPUE and also essentially weight the average CPUE by the level of participation. Therefore, the CPUE provided in the monthly and annual expansion reports will not be equal to the catch divided by the effort as presented in those reports.

The following species, species groups, and abbreviations are used in the tables and graphs of American Samoa's data:

I. Pelagic Management Unit Species (PMUS)

Dolphin (mahimahi)
Blue marlin
Black marlin
Sailfish
Shortbill spearfish
Wahoo
Sharks

II. Bottom Fish Management Unit Species (BMUS)

Jacks (unclassified)
Black jack
Amberjack
Giant trevally
Bottom fish (unclassified)
Groupers (unclassified)
Blacktip grouper
Lunartail grouper
Snappers (unclassified)
Bluelined snapper
Gray jobfish (uku)
Deepwater bottom fish (unclassified)
Yellow opakapaka

II. Bottom Fish Management Unit Species (BMUS) (cont.)

Hawaiian opakapaka
Opakapaka
Gindai (flower snapper)
Yellowtail snapper
Lehi (silverjaw snapper)
Onaga (red or longtail snapper)
Ehu (red snapper)
Emperorfish (unclassified)
Ambon emperor
Redgill emperor

III. Billfish

Blue marlin
Black marlin
Sailfish
Shortbill spearfish

IV. Tunas

Tunas (unclassified)
Skipjack tuna
Yellowfin tuna
Dogtooth tuna
Albacore
Bigeye tuna
Kawakawa

V. Other Tuna

The above tuna species excluding skipjack and yellowfin tuna

VI. Fisheries Categories

A. Pelagics

All PMUS and tuna species plus the following:
Troll fish (unclassified)
Barracuda
Rainbow runner

B. Bottom Fish

All BMUS plus the following:
Bigeye trevally
Bluefin trevally
Goldspot trevally
Trevally
Whitemouth trevally
Peacock grouper
Flagtail grouper
Tomato grouper

B. Bottom Fish (cont.)

Yellowspot grouper
Striped grouper
Spotted grouper
Small mouth grouper
Giant grouper
Rufous snapper
Blacktail snapper
Onespot snapper
Twinspot/red snapper
Humpback snapper
Blood snapper
Brown snapper
Bluelined gindai
Black snapper
Stone's snapper
Kusakar's snapper
Bigeye emperor
Goldenline bream
Longnose emperor
Bluelined bream
Orangespot emperor
Snake mackerel
Oilfish

C. Reef Fish

Reef fish (unclassified)
Mullet
Rabbitfish
Surgeonfish and tangs (unclassified)
Lined surgeon
Yelloweyed surgeon
Convict tang
Dussumier's surgeon
Spotted surgeon
Unicornfish
Squirrelfish (unclassified)
Berndt's soldierfish
Bigeye squirrelfish
Parrotfish
Terapon perch
Wrasse
Goatfish (unclassified)
Pink goatfish
Inshore groupers (unclassified)
Triggerfish
Butterflyfish
Porcupinefish
Inshore snappers (unclassified)

D. Other

- Miscellaneous
- Bigeye scad
- Rays
- Eels
- Invertebrates (unclassified)
- Crabs (unclassified)
- Kona crab
- Mangrove crab
- Spiny lobster
- Slipper lobster
- Shrimp
- Octopus
- Squid
- Clams
- Turtle

INTERPRETATION OF STATISTICS

The user is reminded to pay heed to the precautions and assumptions identified earlier in this document, when making interpretations of or inferences from data reported in the tables and graphs. Remember also that neither the commercial landings summaries nor the creel summaries are based on a census of all the fishing activities, but on samples of those activities. One of the major factors in expanding the creel survey data into monthly and annual estimates is the use of proportionality constants to adjust for percent coverage of the surveys. The flexibility of the survey design allows for refinement of these constants as additional information is gained on the fishing activities. If the constants are improved upon, the basic survey data can be re-expanded to create better overall estimates. However, the variability and species composition would not be expected to change since these statistics are strictly based on the actual survey information collected from the fishermen. The estimates of total landings are considered to be conservative because the inshore fisheries are currently not included in DMWR's sampling programs. However, WPACFIN has developed the basic design for inshore sampling and data expansion systems, and DMWR plans to implement them when resources become available.

Table II.1.1

American Samoa 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Miscellaneous	44	66	1.50
Bigeye scad	1,148	1,561	1.36
Jacks	706	1,115	1.58
Black jack	2,078	3,607	1.74
Whitemouth trevally	50	75	1.50
Barracudas	1,173	1,790	1.53
Small barracuda	671	895	1.33
Sharks	978	484	0.49
Eels	248	336	1.35
Bottom fish	24,570	37,273	1.52
Groupers	900	1,394	1.55
Peacock grouper	643	1,039	1.62
Flagtail grouper	670	1,047	1.56
Tomato grouper	56	94	1.67
Striped grouper	51	84	1.65
Spotted grouper	273	450	1.65
Giant grouper	45	72	1.60
Lunartail grouper	2,925	4,622	1.58
Blue lined snapper	7,059	11,773	1.67
Onespot snapper	24	37	1.52
Twinspot/red snapper	82	111	1.35
Humpback snapper	778	1,272	1.63
Blood snapper	180	291	1.62
Brown jobfish	231	383	1.66
Gray jobfish	1,272	2,104	1.66
Deepwater bottomfish	619	1,006	1.63
Opakapaka	1,012	1,671	1.65
Gindai (flower snap)	571	926	1.62
Lehi (silverjaw)	2,276	4,487	1.97
Onaga (red snapper)	2,101	4,074	1.94
Ehu (red snapper)	2,645	4,684	1.77
Stone's snapper	288	559	1.94
Bigeye emperor	157	251	1.60
Emperors (misc)	554	933	1.69
Longnose emperor	3,736	6,076	1.63
Ambon emperor	1,185	1,886	1.59
Blueline bream	133	219	1.65
Orangespot emperor	457	757	1.66
Redgill emperor	3,272	5,404	1.65
Reef fish	5,237	7,868	1.50
Rudderfish	26	35	1.35
Rabbitfish	10	15	1.50
Lined surgeon	10,453	15,943	1.53
Yellow eyed surgeon	2,844	4,398	1.55
Convict tang	17	25	1.47

Table II.1.1 (cont.)

Species	Pounds	Value	$/lb
Dussumier's surgeon	93	154	1.66
Spotted surgeonfish	35	49	1.40
Unicornfish (misc)	2,177	3,114	1.43
Unicornfish	1,982	3,005	1.52
Squirrelfish	1,525	2,380	1.56
Saber squirrelfish	238	356	1.50
Berndt's soldierfish	439	712	1.62
Bigeye squirrelfish	40	66	1.65
Parrotfish	4,889	7,573	1.55
Wrasse	553	829	1.50
Inshore groupers	283	465	1.64
Dolphin (mahimahi)	5,481	11,115	2.03
Blue marlin	4,381	3,504	0.80
Sailfish	77	58	0.75
Rainbow runner	573	690	1.20
Wahoo	1,237	1,804	1.46
Tunas	156	82	0.53
Skipjack tuna	129,443	88,927	0.69
Dogtooth tuna	2,152	3,539	1.64
Albacore	1,398	2,796	2.00
Yellowfin tuna	39,095	49,951	1.28
Kawakawa	246	316	1.29
Spiny lobster	6,303	14,307	2.27
Octopus	146	198	1.36
Squid	6	8	1.33
Giant clam	2,136	5,926	2.77
** TOTAL **	289,528	335,113	

Table II.1.2

American Samoa January 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Jacks	23	32	1.39
Barracudas	38	38	1.00
Small barracuda	44	65	1.48
Eels	35	47	1.34
Bottom fish	5,688	7,708	1.36
Groupers	35	54	1.54
Lunartail grouper	5	6	1.20
Blue lined snapper	54	86	1.59
Twinspot/red snapper	12	16	1.33
Gray jobfish	89	159	1.79
Longnose emperor	145	218	1.50
Reef fish	714	1,071	1.50
Lined surgeon	1,003	1,484	1.48
Yellow eyed surgeon	369	512	1.39
Convict tang	17	25	1.47
Unicornfish (misc)	313	359	1.15
Parrotfish	306	492	1.61
Wrasse	63	94	1.49
Dolphin (mahimahi)	53	92	1.74
Blue marlin	1,020	775	0.76
Skipjack tuna	3,617	3,797	1.05
Yellowfin tuna	7,609	8,065	1.06
Spiny lobster	1,314	2,930	2.23
Octopus	48	65	1.35
Squid	6	8	1.33
Giant clam	1,956	5,261	2.69
** SUBTOTAL **	24,575	33,458	

Table II.1.3

American Samoa February 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Jacks	353	554	1.57
Black jack	128	212	1.66
Barracudas	698	1,053	1.51
Small barracuda	40	60	1.50
Eels	213	289	1.36
Bottom fish	12,363	19,162	1.55
Flagtail grouper	92	152	1.65
Blue lined snapper	308	472	1.54
Humpback snapper	19	23	1.25
Blood snapper	180	291	1.62
Brown jobfish	231	383	1.66
Opakapaka	287	473	1.65
Onaga (red snapper)	60	120	2.00
Emperors (misc)	100	151	1.51
Ambon emperor	458	760	1.66
Orangespot emperor	132	219	1.66
Redgill emperor	56	70	1.25
Reef fish	1,449	2,187	1.51
Lined surgeon	1,156	1,872	1.62
Yellow eyed surgeon	136	214	1.57
Unicornfish (misc)	1,001	1,451	1.45
Unicornfish	60	99	1.65
Parrotfish	323	503	1.56
Wrasse	490	735	1.50
Inshore groupers	18	29	1.61
Blue marlin	2,631	1,999	0.76
Rainbow runner	88	132	1.50
Tunas	156	82	0.53
Skipjack tuna	10,574	6,166	0.58
Dogtooth tuna	259	445	1.72
Yellowfin tuna	3,740	3,447	0.92
Spiny lobster	2,209	5,986	2.71
Octopus	98	133	1.36
Giant clam	136	544	4.00
** SUBTOTAL **	40,241	50,469	

Table II.1.4

American Samoa March 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Black jack	159	283	1.78
Barracudas	76	120	1.58
Small barracuda	20	25	1.25
Bottom fish	5,207	8,569	1.65
Groupers	62	102	1.65
Peacock grouper	16	27	1.69
Lunartail grouper	91	146	1.60
Blue lined snapper	344	553	1.61
Humpback snapper	125	213	1.70
Opakapaka	153	252	1.65
Lehi (silverjaw)	125	246	1.97
Onaga (red snapper)	59	122	2.07
Longnose emperor	146	235	1.61
Redgill emperor	700	1,127	1.61
Reef fish	1,893	2,839	1.50
Lined surgeon	2,970	4,633	1.56
Yellow eyed surgeon	720	1,224	1.70
Dussumier's surgeon	93	154	1.66
Unicornfish (misc)	134	199	1.49
Unicornfish	412	675	1.64
Squirrelfish	209	351	1.68
Berndt's soldierfish	17	28	1.65
Parrotfish	1,035	1,718	1.66
Dolphin (mahimahi)	107	165	1.54
Rainbow runner	61	83	1.35
Wahoo	362	543	1.50
Skipjack tuna	1,478	1,517	1.03
Dogtooth tuna	191	321	1.68
Albacore	231	462	2.00
Yellowfin tuna	4,338	6,168	1.42
Kawakawa	207	266	1.29
Spiny lobster	614	1,234	2.01
Giant clam	44	121	2.75
** SUBTOTAL **	22,399	34,720	

Table II.1.5

American Samoa April 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Black jack	65	104	1.60
Small barracuda	58	67	1.16
Bottom fish	144	180	1.25
Peacock grouper	231	371	1.61
Lunartail grouper	58	88	1.52
Blue lined snapper	825	1,270	1.54
Onespot snapper	13	20	1.54
Humpback snapper	91	146	1.60
Gray jobfish	211	322	1.53
Lehi (silverjaw)	120	193	1.61
Onaga (red snapper)	19	30	1.58
Stone's snapper	32	51	1.59
Bigeye emperor	10	16	1.60
Longnose emperor	162	259	1.60
Redgill emperor	682	1,050	1.54
Reef fish	1,174	1,761	1.50
Lined surgeon	2,079	3,367	1.62
Yellow eyed surgeon	599	958	1.60
Spotted surgeonfish	6	9	1.50
Unicornfish (misc)	178	293	1.65
Unicornfish	801	1,265	1.58
Berndt's soldierfish	266	430	1.62
Bigeye squirrelfish	32	53	1.66
Parrotfish	1,363	2,194	1.61
Wahoo	81	122	1.51
Skipjack tuna	1,179	1,190	1.01
Dogtooth tuna	32	51	1.59
Albacore	1,167	2,334	2.00
Yellowfin tuna	419	514	1.23
Spiny lobster	1,294	2,303	1.78
** SUBTOTAL **	13,391	21,011	

Table II.1.6

American Samoa May 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Bigeye scad	1,148	1,561	1.36
Black jack	330	648	1.96
Small barracuda	150	188	1.25
Bottom fish	88	109	1.25
Peacock grouper	103	232	2.25
Lunartail grouper	83	129	1.55
Blue lined snapper	703	1,296	1.84
Humpback snapper	89	143	1.61
Lehi (silverjaw)	979	2,095	2.14
Onaga (red snapper)	914	1,910	2.09
Ehu (red snapper)	611	1,341	2.20
Redgill emperor	670	1,232	1.84
Rudderfish	26	35	1.35
Lined surgeon	1,466	1,993	1.36
Yellow eyed surgeon	183	248	1.36
Unicornfish	164	223	1.36
Parrotfish	1,054	1,475	1.40
Dolphin (mahimahi)	10	13	1.25
Rainbow runner	50	65	1.30
Wahoo	24	30	1.25
Skipjack tuna	1,655	1,682	1.02
Dogtooth tuna	31	31	1.00
Yellowfin tuna	955	1,064	1.11
Spiny lobster	277	626	2.26
** SUBTOTAL **	11,762	18,367	

Table II.1.7

American Samoa June 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Whitemouth trevally	50	75	1.50
Barracudas	12	18	1.50
Small barracuda	106	133	1.25
Groupers	105	169	1.61
Peacock grouper	73	125	1.71
Flagtail grouper	217	329	1.52
Lunartail grouper	249	373	1.50
Blue lined snapper	630	927	1.47
Gray jobfish	119	179	1.50
Deepwater bottomfish	44	66	1.50
Lehi (silverjaw)	263	515	1.96
Onaga (red snapper)	193	397	2.06
Ehu (red snapper)	610	945	1.55
Bigeye emperor	147	235	1.60
Longnose emperor	512	773	1.51
Ambon emperor	203	304	1.50
Lined surgeon	228	348	1.53
Yellow eyed surgeon	123	189	1.54
Squirrelfish	172	273	1.59
Parrotfish	154	240	1.56
Dolphin (mahimahi)	2,124	3,525	1.66
Sailfish	77	58	0.75
Rainbow runner	140	108	0.78
Wahoo	163	238	1.46
Skipjack tuna	16,277	10,091	0.62
Dogtooth tuna	123	211	1.72
Yellowfin tuna	5,596	6,600	1.18
Kawakawa	18	23	1.28
Spiny lobster	102	216	2.12
** SUBTOTAL **	28,830	27,682	

Table II.1.8

American Samoa July 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Black jack	189	308	1.63
Barracudas	139	225	1.62
Bottom fish	1,081	1,545	1.43
Groupers	95	136	1.43
Lunartail grouper	27	43	1.59
Blue lined snapper	258	420	1.63
Gray jobfish	31	46	1.48
Lehi (silverjaw)	153	246	1.61
Ehu (red snapper)	119	238	2.00
Longnose emperor	506	819	1.62
Redgill emperor	163	270	1.66
Reef fish	7	10	1.43
Rabbitfish	10	15	1.50
Lined surgeon	556	806	1.45
Yellow eyed surgeon	92	125	1.36
Unicornfish (misc)	289	433	1.50
Unicornfish	306	419	1.37
Squirrelfish	50	72	1.44
Bigeye squirrelfish	8	13	1.63
Parrotfish	168	231	1.38
Dolphin (mahimahi)	1,460	4,063	2.78
Rainbow runner	67	92	1.37
Wahoo	284	414	1.46
Skipjack tuna	16,512	8,872	0.54
Dogtooth tuna	118	175	1.48
Yellowfin tuna	721	895	1.24
Spiny lobster	136	273	2.01
** SUBTOTAL **	23,543	21,203	

Table II.1.9

American Samoa August 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Jacks	133	211	1.58
Black jack	88	176	2.00
Barracudas	200	316	1.58
Small barracuda	38	47	1.25
Sharks	280	72	0.26
Groupers	88	136	1.55
Peacock grouper	133	134	1.01
Spotted grouper	273	450	1.65
Giant grouper	45	72	1.60
Lunartail grouper	522	817	1.56
Blue lined snapper	1,120	2,022	1.81
Twinspot/red snapper	70	95	1.36
Humpback snapper	119	208	1.75
Gray jobfish	137	275	2.01
Deepwater bottomfish	519	856	1.65
Gindai (flower snap)	56	84	1.50
Lehi (silverjaw)	221	444	2.01
Onaga (red snapper)	161	262	1.63
Ehu (red snapper)	181	272	1.50
Stone's snapper	239	478	2.00
Emperors (misc)	19	28	1.50
Longnose emperor	701	1,254	1.79
Lined surgeon	130	146	1.12
Yellow eyed surgeon	63	74	1.17
Unicornfish (misc)	106	149	1.41
Unicornfish	53	53	1.00
Squirrelfish	18	18	1.00
Parrotfish	70	98	1.40
Dolphin (mahimahi)	1,387	2,768	2.00
Rainbow runner	5	7	1.30
Wahoo	102	151	1.48
Skipjack tuna	18,984	10,939	0.58
Dogtooth tuna	123	211	1.72
Yellowfin tuna	2,306	3,405	1.48
Spiny lobster	53	106	2.00
** SUBTOTAL **	28,743	26,834	

Table II.1.10

American Samoa September 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Black jack	50	100	2.00
Barracudas	10	20	2.00
Groupers	338	523	1.55
Lunartail grouper	643	1,009	1.57
Blue lined snapper	588	1,181	2.01
Humpback snapper	33	66	2.00
Gray jobfish	27	54	2.00
Opakapaka	300	495	1.65
Ehu (red snapper)	300	594	1.98
Stone's snapper	17	30	1.76
Emperors (misc)	60	120	2.00
Longnose emperor	440	712	1.62
Blueline bream	133	219	1.65
Orangespot emperor	50	82	1.64
Redgill emperor	331	549	1.66
Squirrelfish	245	389	1.59
Dolphin (mahimahi)	63	104	1.65
Wahoo	63	94	1.49
Skipjack tuna	11,905	5,595	0.47
Dogtooth tuna	400	684	1.71
Yellowfin tuna	2,356	3,416	1.45
** SUBTOTAL **	18,352	16,036	

Table II.1.11

American Samoa October 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Jacks	85	141	1.66
Black jack	311	511	1.64
Small barracuda	103	170	1.65
Sharks	330	178	0.54
Groupers	66	102	1.54
Tomato grouper	31	50	1.60
Striped grouper	51	84	1.65
Lunartail grouper	415	681	1.64
Blue lined snapper	374	587	1.57
Onespot snapper	11	17	1.50
Humpback snapper	90	135	1.50
Gray jobfish	229	382	1.67
Lehi (silverjaw)	221	366	1.66
Onaga (red snapper)	344	611	1.77
Ehu (red snapper)	429	705	1.64
Emperors (misc)	44	72	1.64
Longnose emperor	528	839	1.59
Ambon emperor	19	30	1.60
Orangespot emperor	275	456	1.66
Redgill emperor	31	47	1.50
Lined surgeon	270	378	1.40
Yellow eyed surgeon	154	235	1.53
Spotted surgeonfish	29	40	1.38
Unicornfish	113	159	1.41
Squirrelfish	271	392	1.44
Saber squirrelfish	24	36	1.50
Parrotfish	191	269	1.41
Inshore groupers	75	123	1.64
Dolphin (mahimahi)	72	119	1.65
Blue marlin	688	688	1.00
Rainbow runner	88	109	1.25
Wahoo	31	39	1.25
Skipjack tuna	13,523	9,537	0.71
Dogtooth tuna	63	104	1.65
Yellowfin tuna	3,327	5,817	1.75
Spiny lobster	72	144	2.00
** SUBTOTAL **	22,976	24,350	

Table II.1.12

American Samoa November 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Miscellaneous	44	66	1.50
Jacks	112	178	1.58
Black jack	341	523	1.53
Sharks	180	46	0.26
Groupers	111	172	1.55
Peacock grouper	87	150	1.72
Flagtail grouper	215	337	1.57
Tomato grouper	25	44	1.75
Lunartail grouper	554	894	1.61
Blue lined snapper	1,411	2,230	1.58
Humpback snapper	109	161	1.48
Gray jobfish	429	687	1.60
Deepwater bottomfish	56	84	1.50
Opakapaka	272	451	1.66
Gindai (flower snap)	515	841	1.64
Lehi (silverjaw)	194	382	1.97
Onaga (red snapper)	351	623	1.77
Ehu (red snapper)	263	328	1.25
Longnose emperor	436	710	1.63
Ambon emperor	505	792	1.57
Redgill emperor	638	1,059	1.66
Lined surgeon	595	916	1.54
Yellow eyed surgeon	405	619	1.53
Unicornfish (misc)	156	230	1.47
Unicornfish	73	112	1.53
Squirrelfish	421	665	1.58
Saber squirrelfish	214	321	1.50
Berndt's soldierfish	156	254	1.63
Parrotfish	225	353	1.57
Inshore groupers	190	313	1.65
Dolphin (mahimahi)	104	105	1.01
Rainbow runner	56	70	1.25
Wahoo	13	16	1.25
Skipjack tuna	11,218	12,715	1.13
Yellowfin tuna	3,289	4,759	1.45
Kawakawa	21	27	1.29
Spiny lobster	232	489	2.11
** SUBTOTAL **	24,214	32,721	

Table II.1.13

American Samoa December 1988 Estimated Commercial Landings

Species	Pounds	Value	$/lb
Black jack	417	742	1.78
Small barracuda	113	141	1.25
Sharks	188	188	1.00
Flagtail grouper	146	229	1.57
Lunartail grouper	278	436	1.57
Blue lined snapper	445	729	1.64
Humpback snapper	104	177	1.70
Ehu (red snapper)	132	261	1.98
Emperors (misc)	331	562	1.70
Longnose emperor	160	257	1.61
Squirrelfish	139	221	1.59
Dolphin (mahimahi)	101	161	1.60
Blue marlin	43	43	1.00
Rainbow runner	19	24	1.30
Wahoo	114	158	1.38
Skipjack tuna	22,522	16,827	0.75
Dogtooth tuna	812	1,306	1.61
Yellowfin tuna	4,441	5,802	1.31
** SUBTOTAL **	30,503	28,264	
** TOTAL **	289,528	335,113	

Table II.2.1

American Samoa 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Miscellaneous	44	66	1.50
Jacks	94	131	1.40
Black jack	136	187	1.37
Whitemouth trevally	50	75	1.50
Barracudas	38	38	1.00
Small barracuda	426	533	1.25
Sharks	313	313	1.00
Bottom fish	531	664	1.25
Groupers	15	23	1.50
Tomato grouper	56	94	1.67
Lunartail grouper	244	369	1.51
Blue lined snapper	635	905	1.42
Onespot snapper	11	17	1.50
Humpback snapper	160	220	1.37
Gray jobfish	28	34	1.25
Deepwater bottomfish	100	150	1.50
Gindai (flower snap)	132	198	1.50
Onaga (red snapper)	415	591	1.42
Ehu (red snapper)	794	1,125	1.42
Emperors (misc)	19	28	1.50
Ambon emperor	19	30	1.60
Redgill emperor	103	136	1.33
Squirrelfish	151	229	1.52
Saber squirrelfish	48	71	1.50
Dolphin (mahimahi)	124	155	1.25
Blue marlin	730	730	1.00
Rainbow runner	316	411	1.30
Wahoo	213	266	1.25
Skipjack tuna	5,108	5,302	1.04
Dogtooth tuna	206	206	1.00
Yellowfin tuna	5,312	5,727	1.08
Kawakawa	8	8	1.00
** TOTAL **	16,575	19,029	

Table II.2.2

American Samoa January 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Barracudas	38	38	1.00
Bottom fish	244	305	1.25
** SUBTOTAL **	281	342	

Table II.2.3

American Samoa February 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Jacks	38	47	1.25
Blue lined snapper	63	78	1.25
Humpback snapper	19	23	1.25
Redgill emperor	56	70	1.25
Skipjack tuna	81	81	1.00
Yellowfin tuna	88	88	1.00
** SUBTOTAL **	344	388	

Table II.2.4

American Samoa March 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Small barracuda	20	25	1.25
Bottom fish	56	70	1.25
Dolphin (mahimahi)	31	39	1.25
Rainbow runner	11	15	1.30
Skipjack tuna	686	686	1.00
Dogtooth tuna	10	10	1.00
Yellowfin tuna	678	678	1.00
Kawakawa	8	8	1.00
** SUBTOTAL **	1,500	1,530	

Table II.2.5

American Samoa April 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Bottom fish	144	180	1.25
Yellowfin tuna	50	50	1.00
** SUBTOTAL **	194	230	

Table II.2.6

American Samoa May 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Black jack	34	51	1.50
Small barracuda	150	188	1.25
Bottom fish	88	109	1.25
Lunartail grouper	50	75	1.50
Blue lined snapper	50	75	1.50
Humpback snapper	15	21	1.39
Onaga (red snapper)	15	23	1.50
Ehu (red snapper)	44	66	1.50
Dolphin (mahimahi)	10	13	1.25
Rainbow runner	50	65	1.30
Wahoo	24	30	1.25
Skipjack tuna	906	933	1.03
Dogtooth tuna	31	31	1.00
Yellowfin tuna	768	829	1.08
** SUBTOTAL **	2,234	2,507	

Table II.2.7

American Samoa June 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Whitemouth trevally	50	75	1.50
Small barracuda	106	133	1.25
Blue lined snapper	50	75	1.50
Deepwater bottomfish	44	66	1.50
Rainbow runner	38	56	1.50
Wahoo	30	38	1.25
Yellowfin tuna	31	34	1.08
** SUBTOTAL **	349	476	

Table II.2.8

American Samoa July 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Dolphin (mahimahi)	43	53	1.25
Rainbow runner	50	65	1.30
Wahoo	53	66	1.25
Skipjack tuna	243	250	1.03
Dogtooth tuna	14	14	1.00
Yellowfin tuna	449	485	1.08
** SUBTOTAL **	850	932	

Table II.2.9

American Samoa August 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Jacks	31	47	1.50
Small barracuda	38	47	1.25
Lunartail grouper	31	47	1.50
Blue lined snapper	50	75	1.50
Humpback snapper	14	19	1.39
Gindai (flower snap)	56	84	1.50
Onaga (red snapper)	119	178	1.50
Ehu (red snapper)	181	272	1.50
Emperors (misc)	19	28	1.50
Dolphin (mahimahi)	26	33	1.25
Rainbow runner	5	7	1.30
Wahoo	11	14	1.25
Skipjack tuna	656	676	1.03
Dogtooth tuna	35	35	1.00
Yellowfin tuna	398	429	1.08
** SUBTOTAL **	1,670	1,991	

Table II.2.10

American Samoa October 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Black jack	31	47	1.50
Sharks	125	125	1.00
Groupers	15	23	1.50
Tomato grouper	31	50	1.60
Lunartail grouper	63	97	1.55
Blue lined snapper	169	257	1.52
Onespot snapper	11	17	1.50
Humpback snapper	73	107	1.47
Onaga (red snapper)	155	233	1.50
Ehu (red snapper)	306	459	1.50
Ambon emperor	19	30	1.60
Redgill emperor	31	47	1.50
Squirrelfish	100	153	1.53
Saber squirrelfish	24	36	1.50
Blue marlin	688	688	1.00
Rainbow runner	88	109	1.25
Wahoo	31	39	1.25

Table II.2.10 (cont.)

Species	Pounds	Value	$/lb
Skipjack tuna	238	238	1.00
Yellowfin tuna	309	355	1.15
** SUBTOTAL **	2,505	3,107	

Table II.2.11

American Samoa November 1988 Estimated Manu'a Landings

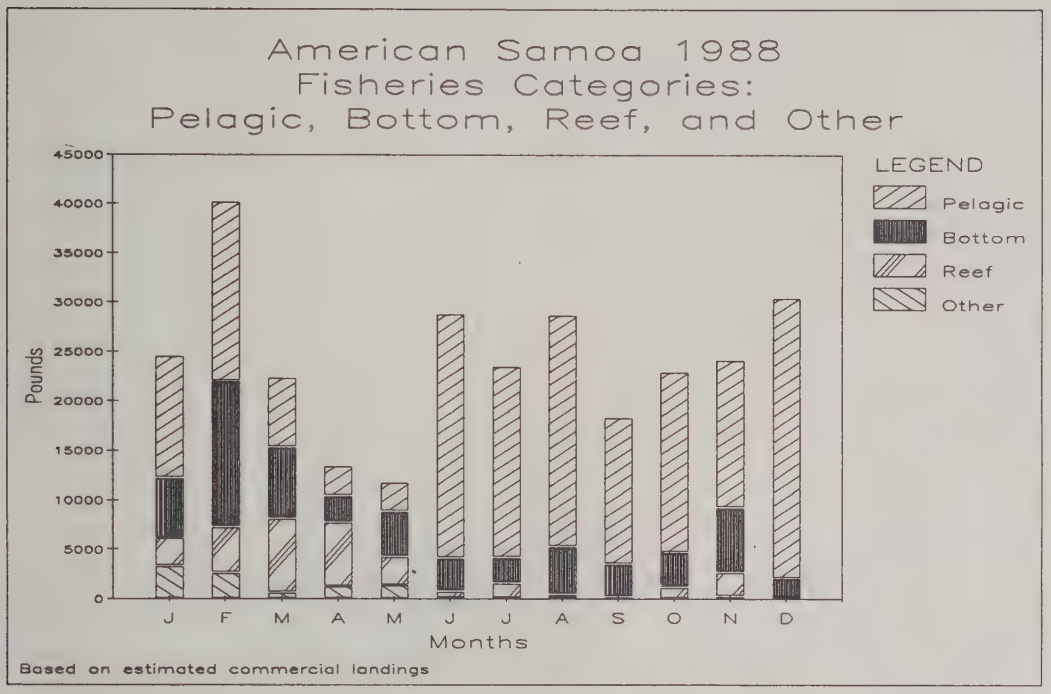
Species	Pounds	Value	$/lb
Miscellaneous	44	66	1.50
Jacks	25	38	1.50
Black jack	71	89	1.25
Tomato grouper	25	44	1.75
Lunartail grouper	100	150	1.50
Blue lined snapper	254	345	1.36
Humpback snapper	40	50	1.25
Gray jobfish	28	34	1.25
Deepwater bottomfish	56	84	1.50
Gindai (flower snap)	76	113	1.50
Onaga (red snapper)	126	158	1.25
Ehu (red snapper)	263	328	1.25
Redgill emperor	15	19	1.25
Squirrelfish	51	77	1.52
Saber squirrelfish	24	36	1.50
Rainbow runner	56	70	1.25
Wahoo	13	16	1.25
Skipjack tuna	324	405	1.25
Yellowfin tuna	200	250	1.25
** SUBTOTAL **	1,789	2,371	

Table II.2.12

American Samoa December 1988 Estimated Manu'a Landings

Species	Pounds	Value	$/lb
Small barracuda	113	141	1.25
Sharks	188	188	1.00
Dolphin (mahimahi)	14	17	1.25
Blue marlin	43	43	1.00
Rainbow runner	19	24	1.30
Wahoo	51	64	1.25
Skipjack tuna	1,975	2,034	1.03
Dogtooth tuna	116	116	1.00
Yellowfin tuna	2,343	2,530	1.08
** SUBTOTAL **	4,860	5,157	
** TOTAL **	16,575	19,029	

Figure II.1.1



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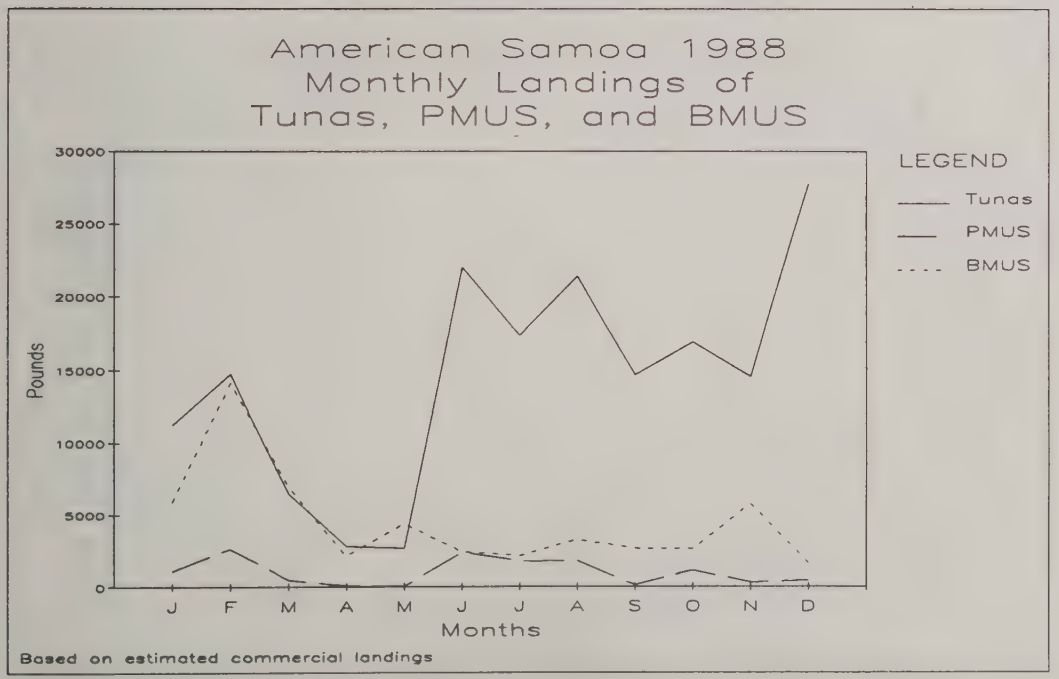
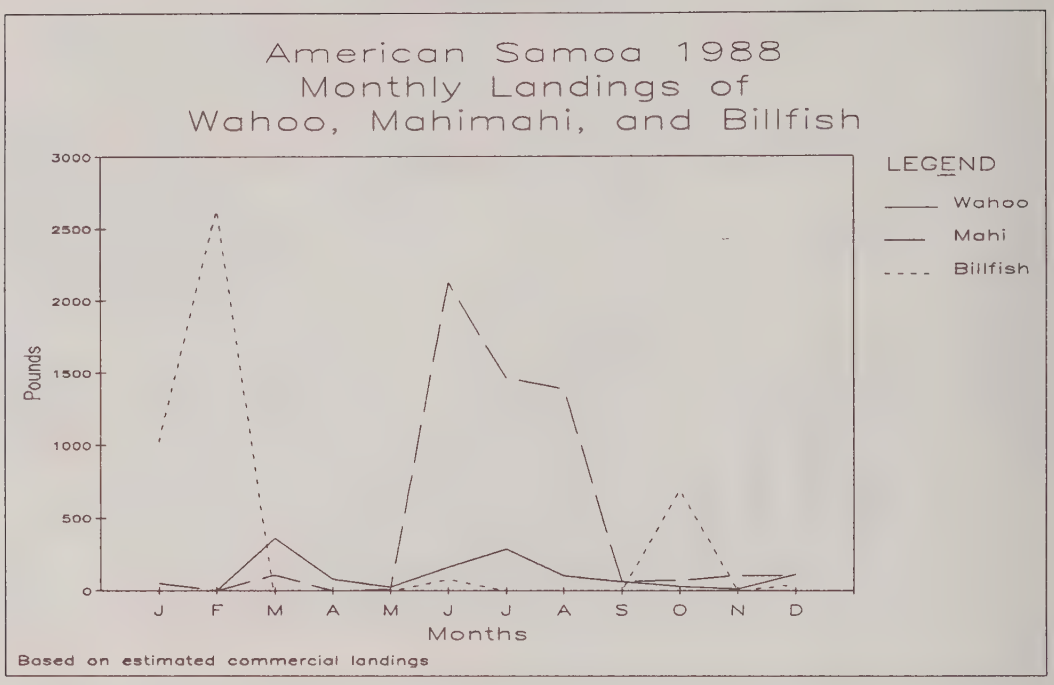


Figure II.1.3



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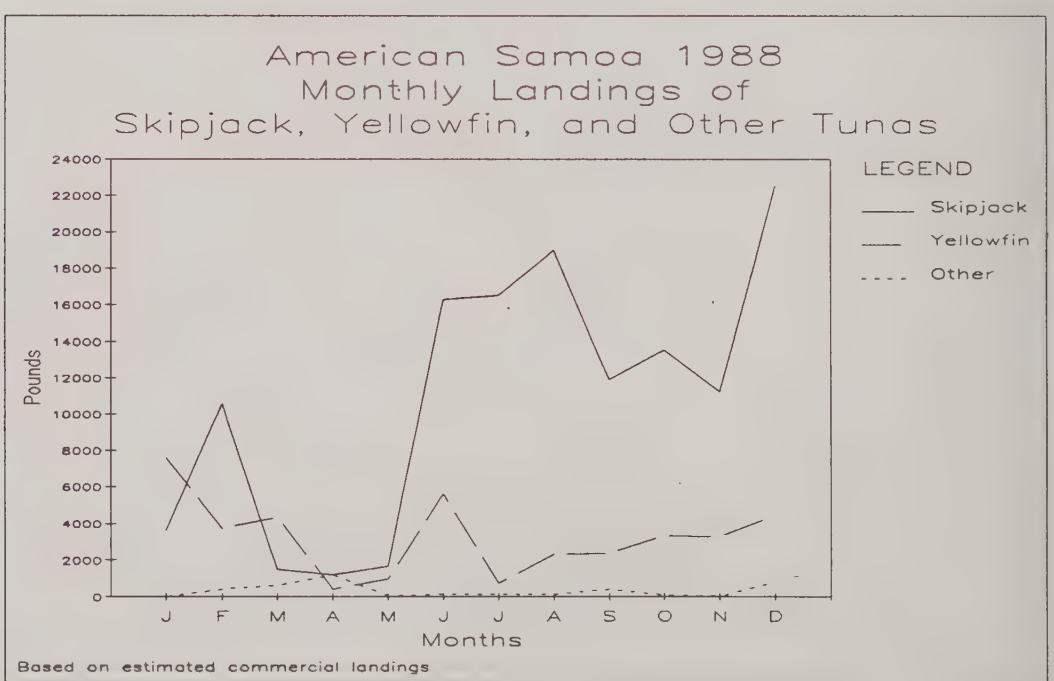

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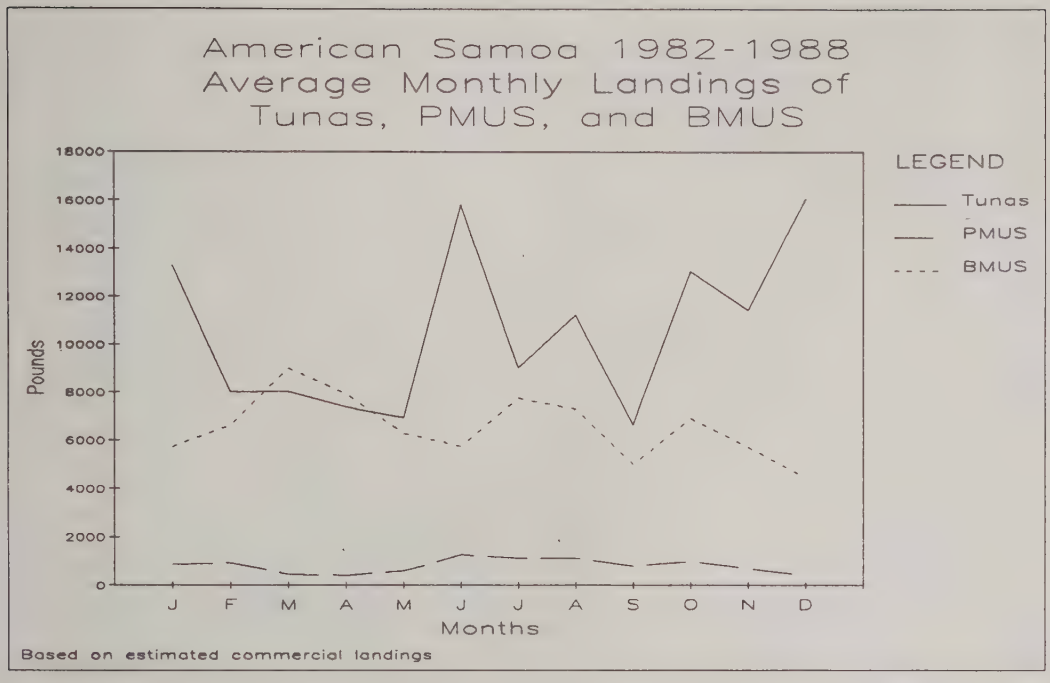

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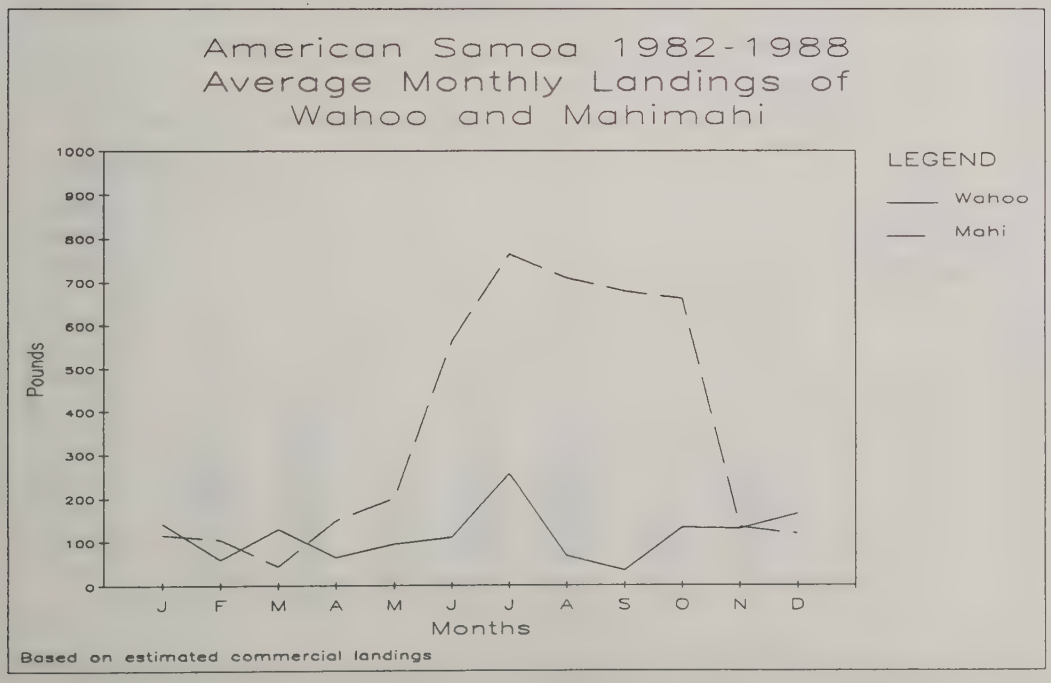

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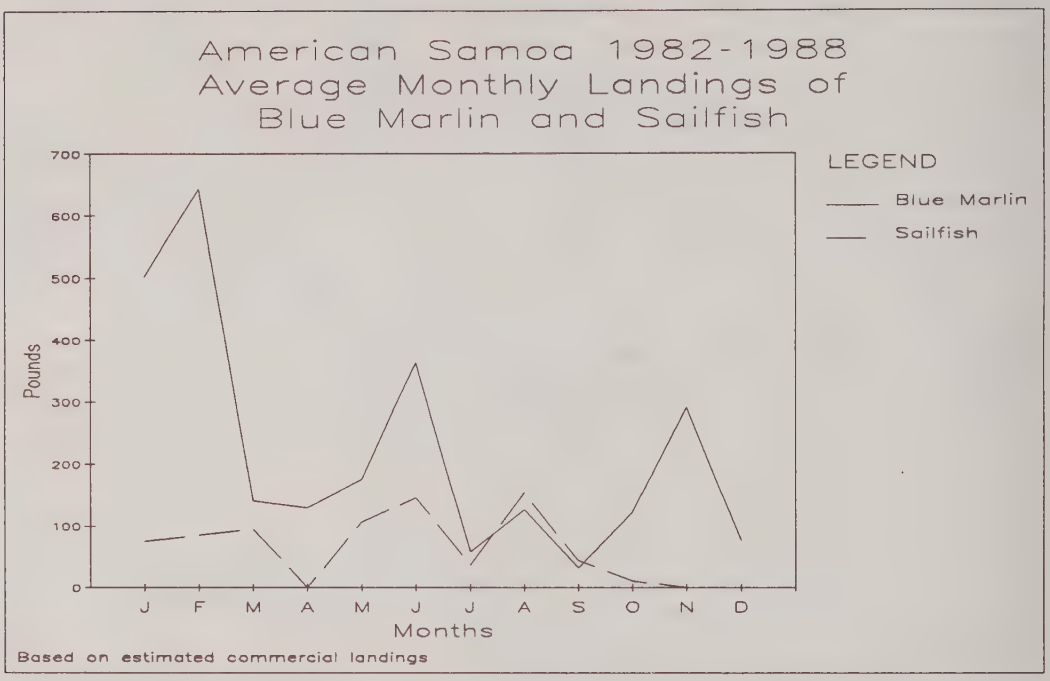

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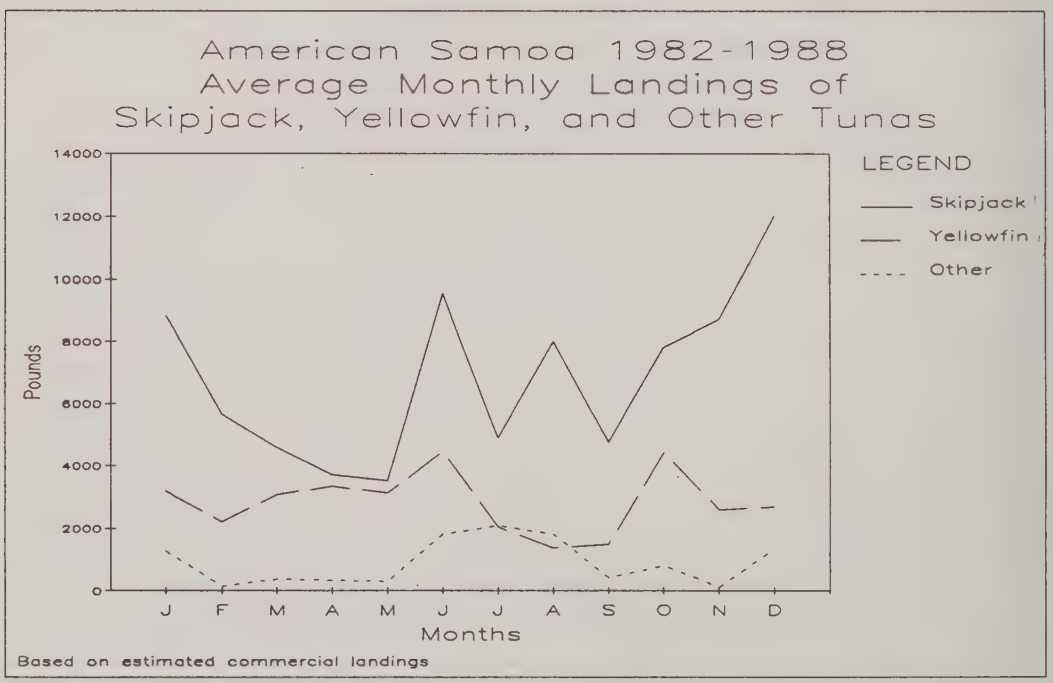

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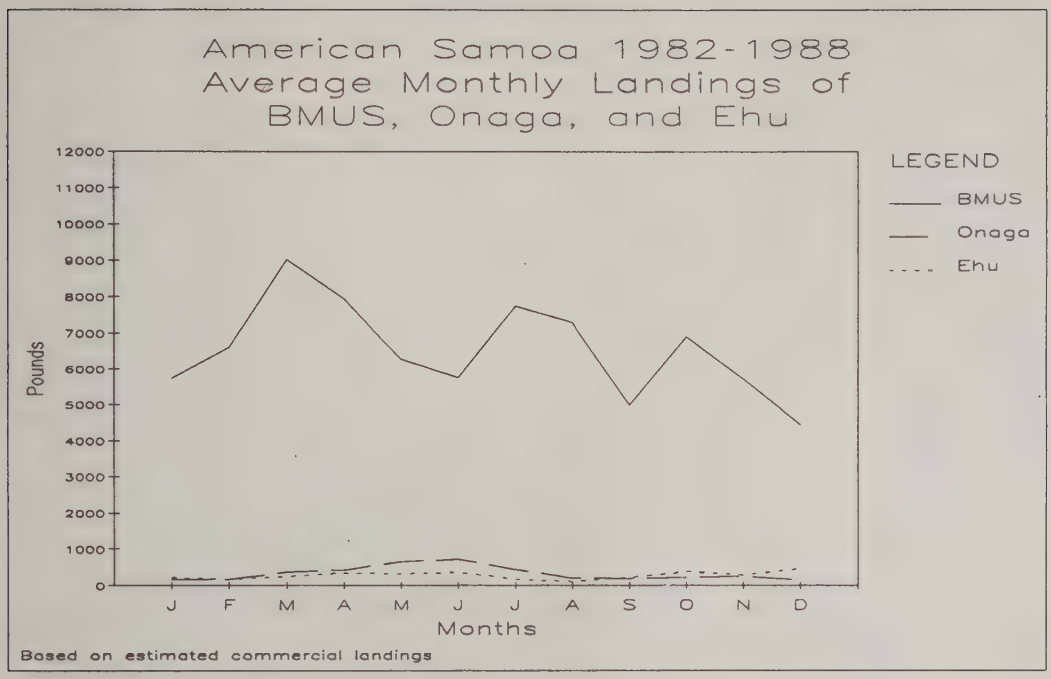

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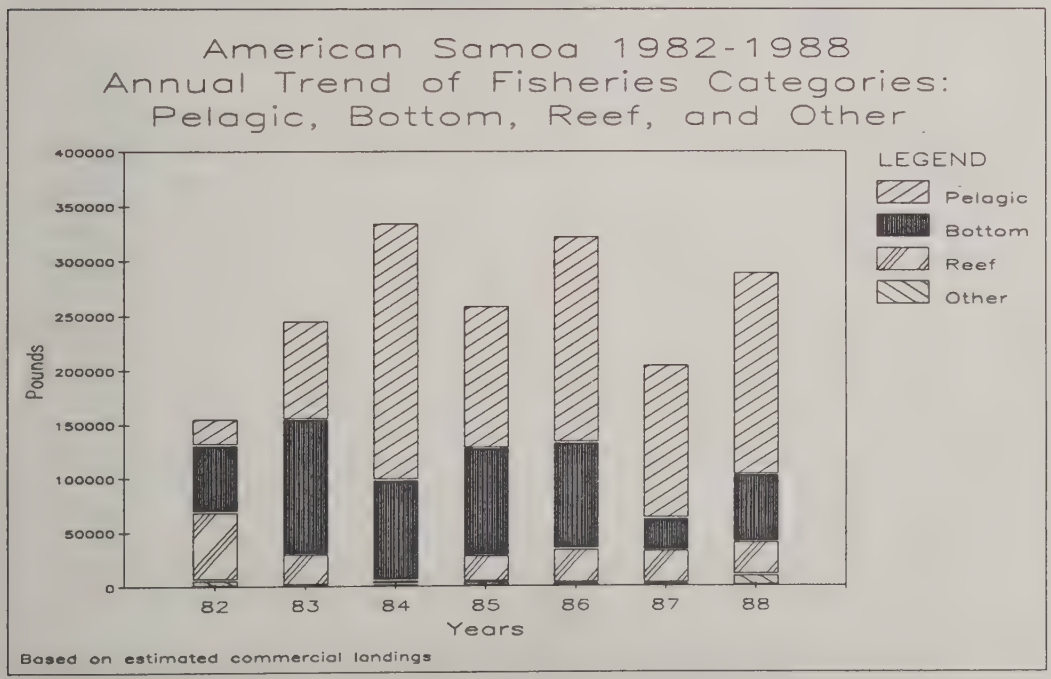

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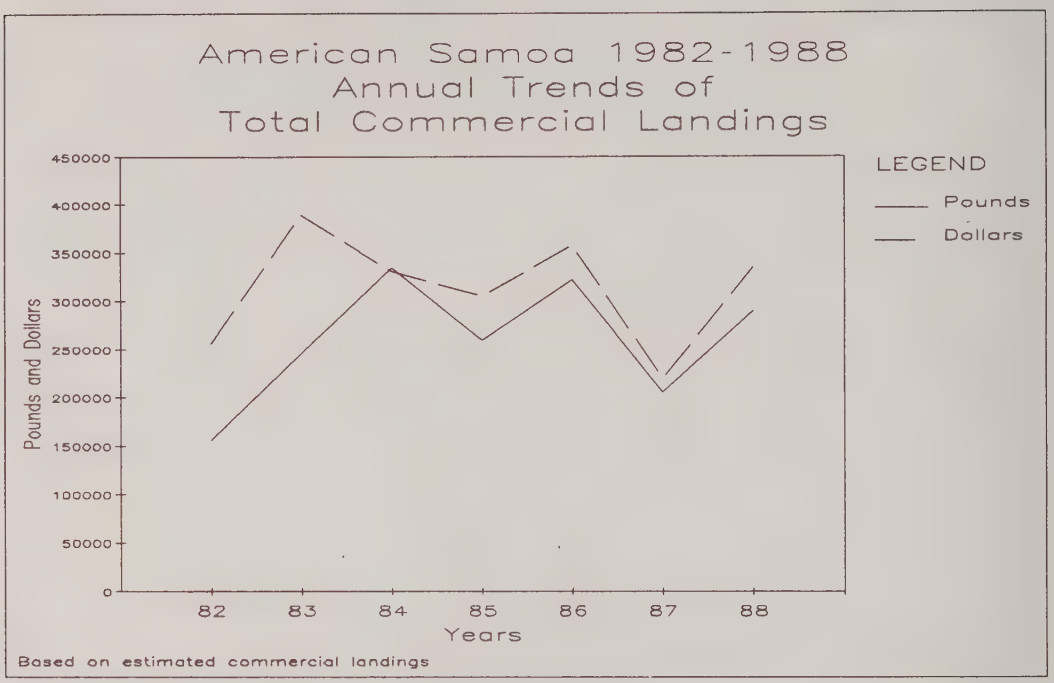

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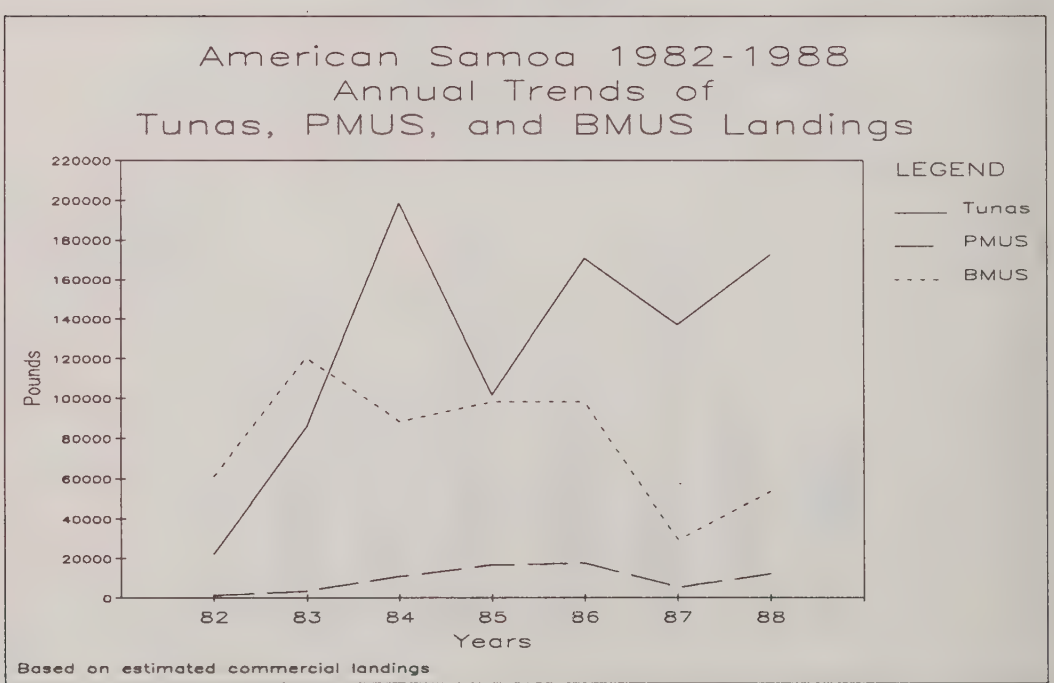

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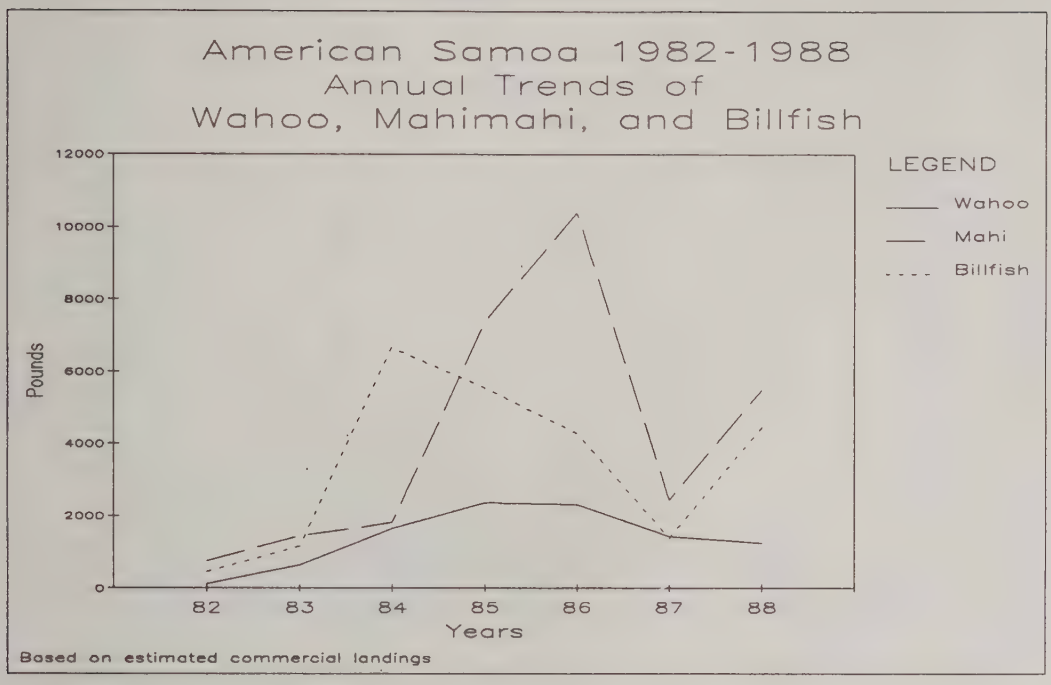

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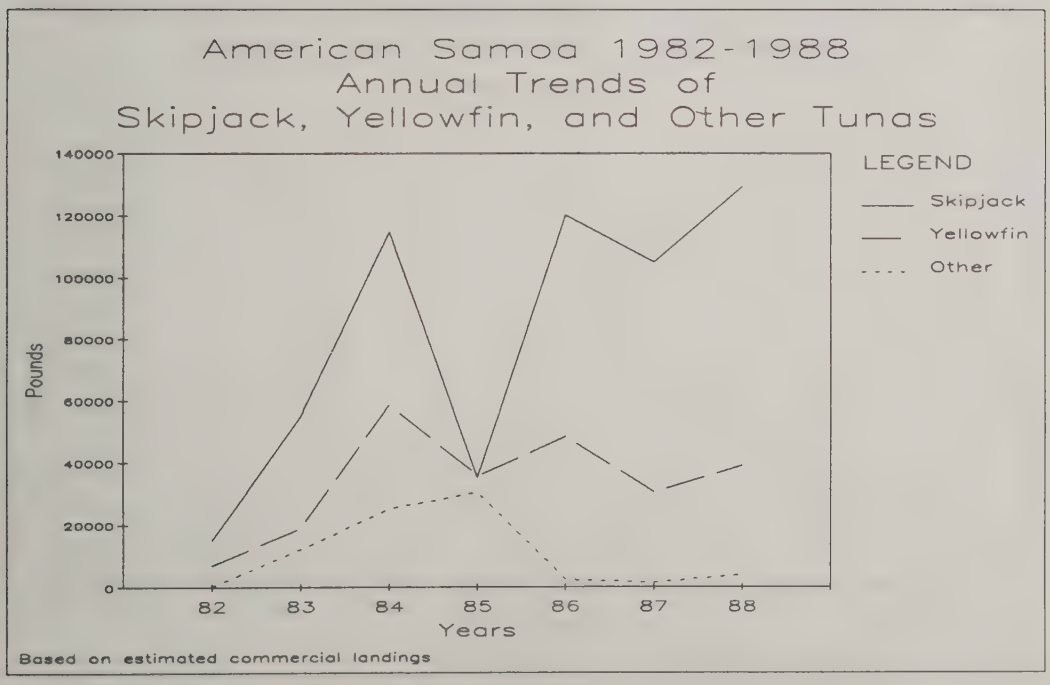

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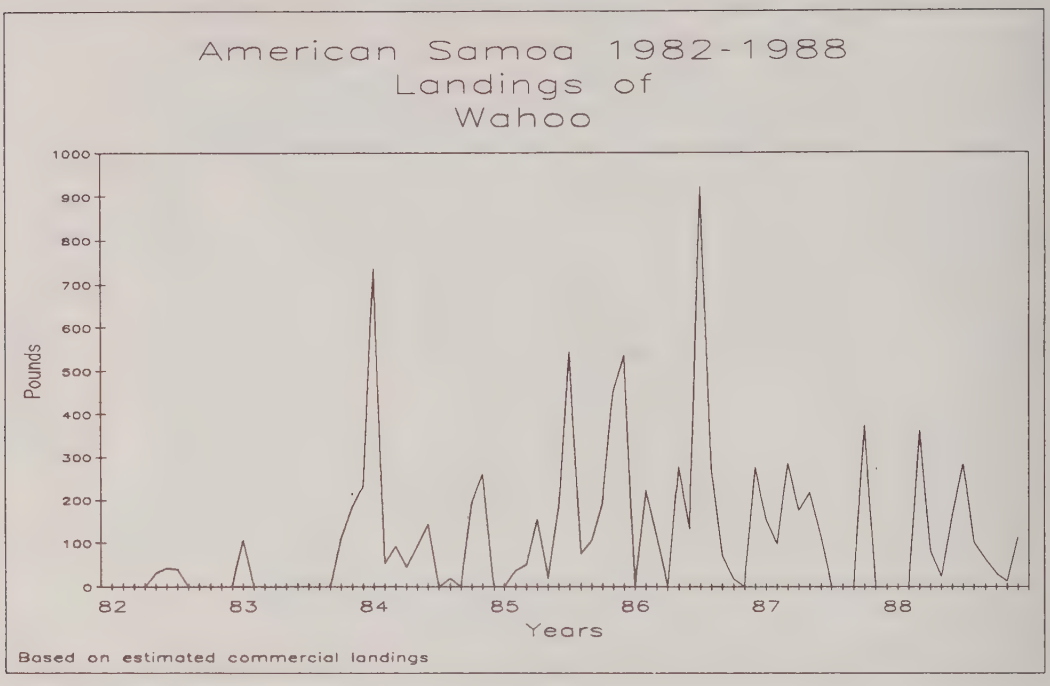

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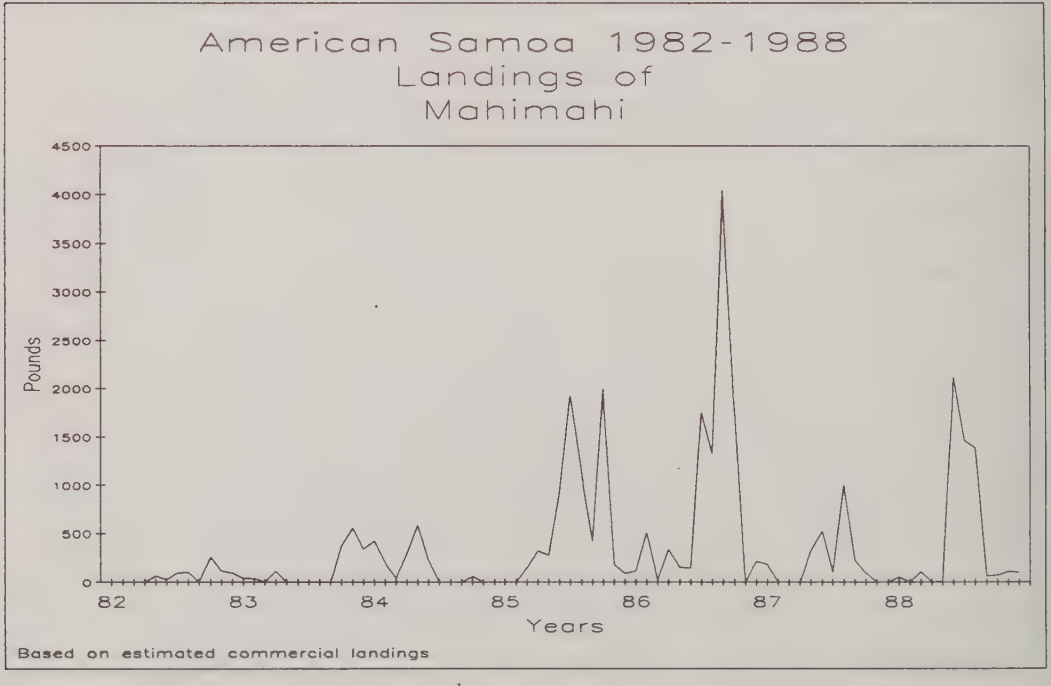

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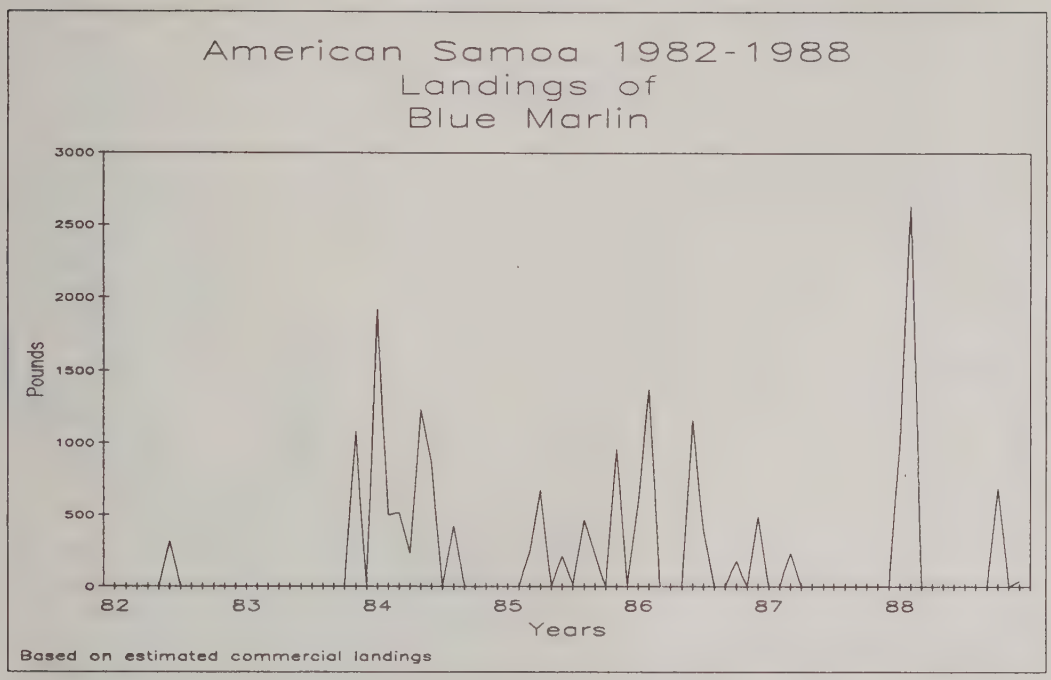

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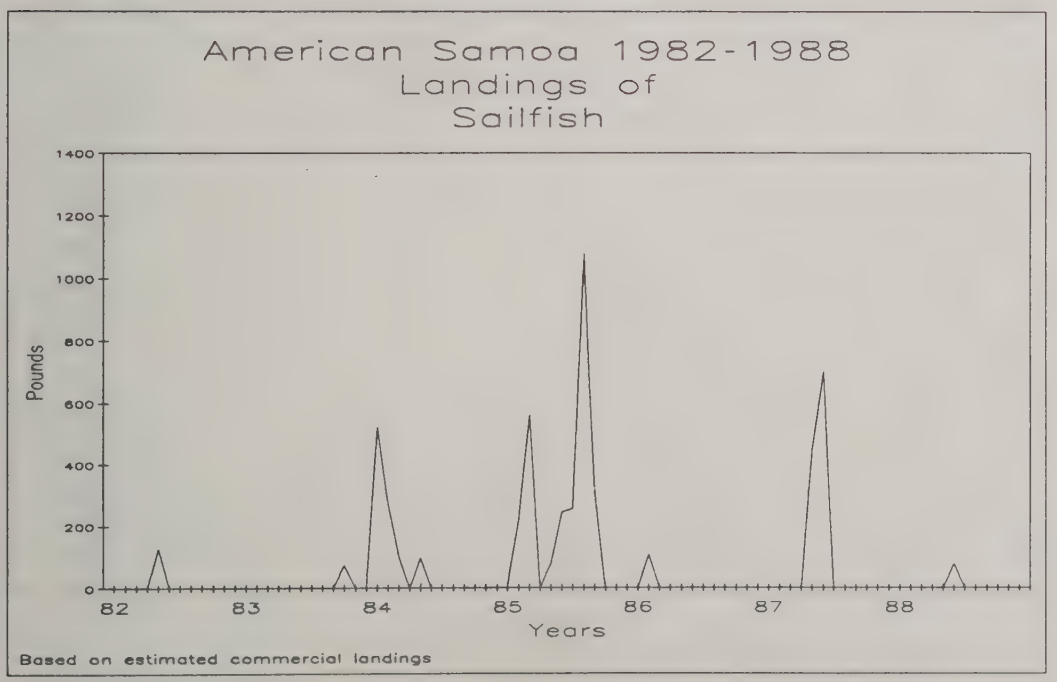

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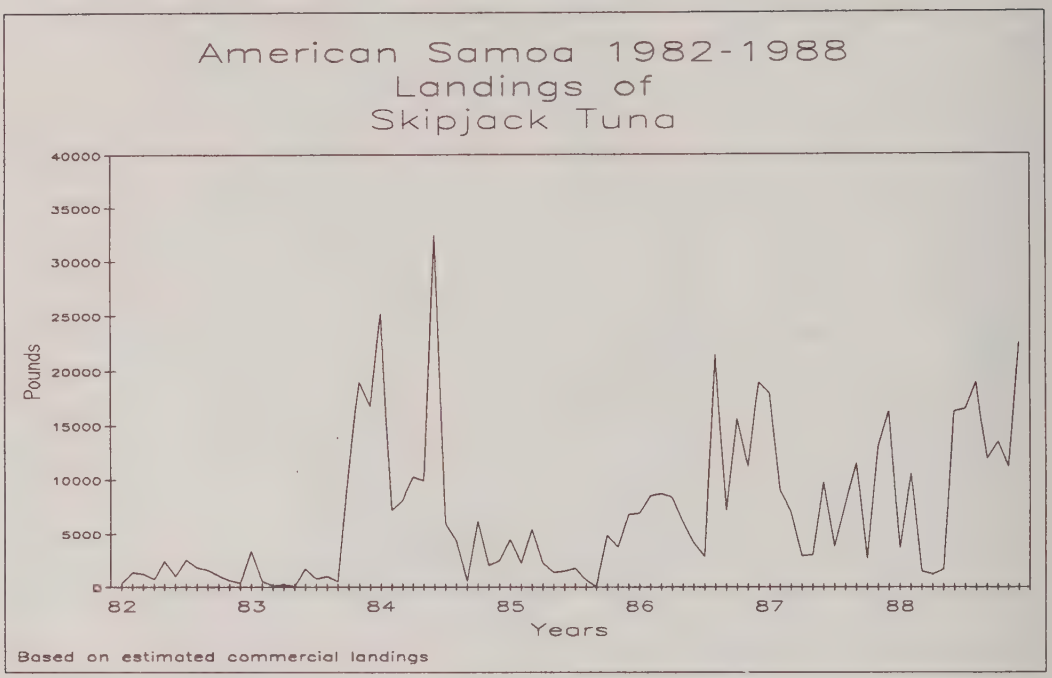

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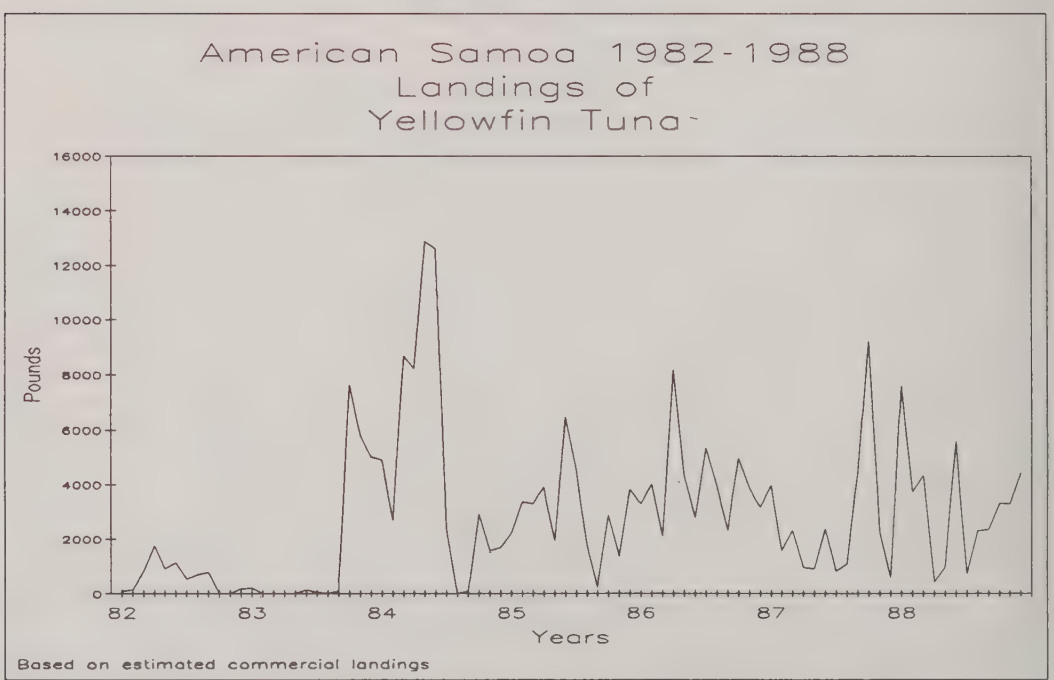

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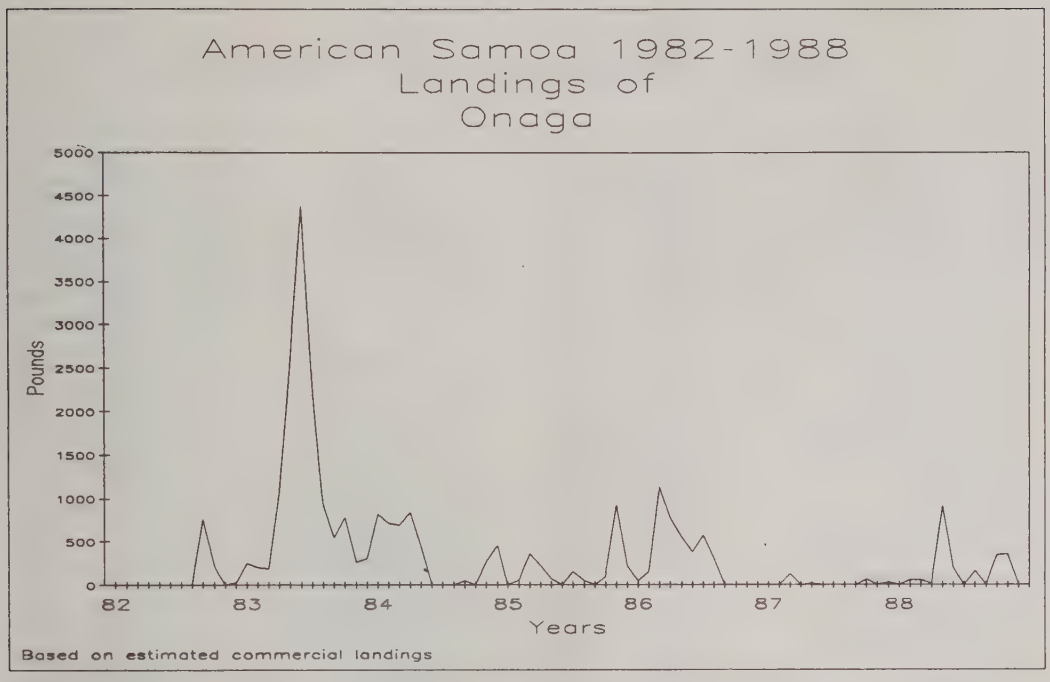

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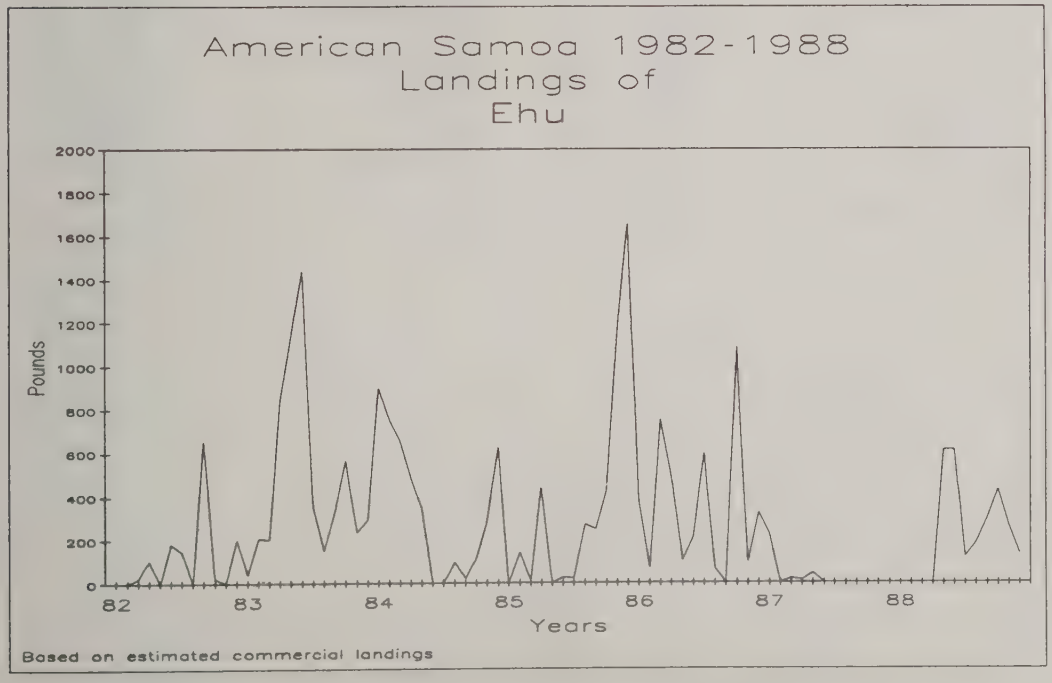


Table II.3.1

Tutuila 1988 Annual
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	TOTAL POUNDS	% SP. COMP.
Bigeye scad	1157.5	0.36	Jacks	582.2	0.18
Black jack	1949.1	0.61	Barracudas	1202.5	0.38
Large barracuda	39.1	0.01	Small barracuda	633.5	0.20
Sharks	3686.9	1.15	Eels	222.0	0.07
Bottom fish	23196.4	7.24	Groupers	930.3	0.29
Peacock grouper	642.7	0.20	Flagtail grouper	675.5	0.21
Striped grouper	55.0	0.02	Spotted grouper	270.9	0.08
Giant grouper	45.2	0.01	Lunartail grouper	3297.1	1.03
Blue lined snapper	6694.5	2.09	Onespot snapper	14.7	.00
Twinspot/red snapper	482.6	0.15	Humpback snapper	643.1	0.20
Blood snapper	160.1	0.05	Brown jobfish	201.5	0.06
Gray jobfish	1320.0	0.41	Deepwater bottomfish	515.1	0.16
Opakapaka	1060.6	0.33	Blue lined gindai	156.3	0.05
Gindai (flower snap)	453.7	0.14	Lehi (silverjaw)	2126.5	0.66
Onaga (red snapper)	1525.5	0.48	Ehu (red snapper)	1761.1	0.55
Stone's snapper	457.2	0.14	Bigeye emperor	158.0	0.05
Emperors (misc)	531.7	0.17	Longnose emperor	4348.1	1.36
Ambon emperor	1145.1	0.36	Blueline bream	146.5	0.05
Orangespot emperor	893.2	0.28	Redgill emperor	3277.4	1.02
Reef fish	5384.2	1.68	Rudderfish	19.2	0.01
Rabbitfish	10.5	0	Lined surgeon	10520.4	3.28
Yellow eyed surgeon	2925.4	0.91	Convict tang	17.5	0.01
Dussumier's surgeon	105.0	0.03	Spotted surgeonfish	36.7	0.01
Unicornfish (misc)	2094.0	0.65	Unicornfish	2060.6	0.64
Squirrelfish	1530.0	0.48	Saber squirrelfish	201.5	0.06
Berndt's soldierfish	471.1	0.15	Bigeye squirrelfish	43.7	0.01
Parrotfish	4832.4	1.51	Wrasse	521.3	0.16
Inshore groupers	329.0	0.10	Dolphin (mahimahi)	7060.3	2.20
Blue marlin	8966.7	2.80	Sailfish	390.0	0.12
Rainbow runner	623.4	0.19	Wahoo	1710.9	0.53
Tunas	466.1	0.15	Skipjack tuna	145622.5	45.43
Dogtooth tuna	2238.0	0.70	Albacore	1830.8	0.57
Yellowfin tuna	43766.9	13.65	Kawakawa	692.7	0.22
Spiny lobster	6143.9	1.92	Octopus	134.0	0.04
Squid	5.5	0	Giant clam	3111.8	0.97
Total all species:	320524.4	100.00			

Table II.3.2

Tutuila 1988 Annual
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	200701.1	9	5164.8	8	704.4	8	15711.3	8	2143.2	8	43.3	7
Bottom fish	26358.5	18	1589.1	16	150.2	15	3922.7	16	373.9	16	16.3	11
Troll-bottom	33642.9	17	1621.9	16	118.6	14	5065.9	18	362.4	15	22.8	17
Spearing	54985.9	12	2172.3	11	256.1	10	10092.2	12	1143.5	11	26.1	8
Atulai	1157.5	60	49.0	52	10.3	44	90.1	52	26.7	51	37.6	54*
Long line	3678.5	33	195.5	36	30.5	32	405.4	36	67.5	36	23.3	30
Total:	320524.3	7	10792.6	7	1246.4	6	35287.7	7	4041.8	6	33.7	6

* Not enough data to properly compute Coefficient of Variation (CV).

Table II.4.1

Tutuila January 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	13490.7	33	616.8	29	82.4	27	1930.1	28	254.6	27	21.9	20
Bottom fish	1217.8	64	112.0	53	8.7	53	278.0	54	21.2	53	11.1	86*
Troll-bottom	2235.5	39	147.3	37	13.4	36	527.7	36	49.8	37	17.0	41
Spearing	11009.4	26	485.8	26	54.8	20	1972.1	28	217.4	22	29.6	36
Total:	27953.3	16	1361.9	14	154.4	13	4708.0	16	523.8	15	21.1	15

Table II.4.2

Tutuila February 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	24922.6	38	575.8	34	63.2	35	1870.9	30	204.7	32	38.8	28
Bottom fish	2318.3	48	218.5	51	20.7	55	560.2	52	53.4	56	11.2	23*
Troll-bottom	8713.5	49	340.1	44	18.2	37	1175.1	55	53.8	40	22.4	20
Spearing	15578.0	24	530.3	17	53.5	16	2908.4	18	289.1	17	27.9	16
Total:	51532.4	32	1664.8	28	151.1	24	6514.6	26	592.1	21	28.5	13

Table II.4.3

Tutuila March 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	7281.4	23	285.4	22	41.1	22	1002.4	23	142.7	24	24.9	17
Bottom fish	2440.8	57	158.6	53	15.8	50	388.5	57	38.0	54	14.0	20*
Troll-bottom	2822.4	40	139.3	40	9.7	39	330.4	42	22.7	40	20.2	14*
Spearing	10893.5	21	424.2	20	50.1	18	1926.6	23	226.5	20	27.5	14
Atulai	225.4	76	2.8	76	2.8	76	14.1	76	14.1	76	80.0	0*
Long line	1973.5	44	60.6	45	12.1	45	147.2	54	29.4	54	34.7	58*
Total:	25636.8	13	1070.8	13	126.1	12	3809.2	14	445.2	12	24.2	8

* Not enough data to properly compute Coefficient of Variation (CV).

Table II.4.4

Tutuila 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	874.3	73	17.1	73	2.9	73	34.3	73	5.7	73	51.0	0*
Bottom fish	1385.0	55	107.1	53	8.6	52	251.4	55	20.0	54	12.4	17*
Troll-bottom	1285.0	56	81.9	60	7.6	61	245.7	60	22.9	61	16.6	0*
Spearing	7999.6	29	263.8	25	35.2	24	1118.1	34	137.1	26	28.6	11
Atulai	28.6	73	14.3	73	2.9	73	14.3	73	2.9	73	2.0	0*
Long line	1653.8	57	150.5	63	18.1	52	264.3	57	34.3	48	11.8	63*
Total:	13226.2	26	634.8	27	75.2	25	1928.1	28	222.9	25	22.0	12

Table II.4.5

Tutuila May 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	1466.7	88	100.0	88	14.3	88	266.7	88	38.1	88	14.7	0*
Bottom fish	4508.6	65	149.8	60	14.8	62	299.5	60	29.5	62	27.9	0*
Spearing	3146.9	50	147.5	52	18.5	50	689.9	56	87.0	53	23.0	15*
Atulai	919.7	81	30.0	81	3.8	81	60.0	81	7.5	81	30.7	0*
Total:	10041.8	44	427.2	45	46.3	43	1316.1	47	152.1	44	25.0	8

Table II.4.6

Tutuila June 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	23996.2	25	447.2	22	61.9	21	1100.3	25	156.8	25	61.5	13
Bottom fish	1682.6	57	96.9	55	9.6	56	307.4	55	29.3	55	17.0	0*
Troll-bottom	2766.1	60	119.6	57	10.9	56	280.9	59	25.4	58	22.0	18*
Spearing	935.0	79	29.0	79	3.6	79	174.0	79	21.7	79	32.3	0*
Total:	29379.9	20	692.7	15	86.0	15	1862.5	18	233.3	18	48.6	15

* Not enough data to properly compute Coefficient of Variation (CV).

Table II.4.7

Tutuila July 1988
Offshore Creel Survey Expansion Summary

Gear	catch	cv	boat hrs	cv	boat cnt	cv	prsn hrs	cv	prsn cnt	cv	cpue	cv
Trolling	19922.3	22	382.7	20	54.4	22	926.2	24	132.6	26	53.7	18
Bottom fish	962.3	57	68.2	56	6.8	56	136.4	56	13.6	56	14.1	0*
Troll-bottom	909.3	58	78.5	57	6.8	56	190.9	56	17.0	57	11.4	0*
Spearing	2754.2	36	151.5	35	20.4	33	823.2	42	95.3	36	18.0	42*
Total:	24548.0	17	680.9	11	88.5	13	2076.8	18	258.6	16	39.9	19

Table II.4.8

Tutuila August 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	26145.4	25	666.5	28	83.3	24	1846.6	28	229.4	25	49.3	34
Bottom fish	1018.4	56	129.7	58	7.6	53	259.4	58	15.3	53	10.7	94*
Troll-bottom	3003.5	50	180.3	52	10.6	43	518.9	53	31.0	44	19.0	12*
Spearing	554.2	54	68.7	56	7.6	53	228.9	64	22.9	56	8.6	24*
Total:	30721.5	24	1045.1	25	109.1	23	2853.7	24	298.5	22	32.3	14

Table II.4.9

Tutuila September 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	15213.9	31	366.4	25	46.3	24	1055.3	25	138.7	25	37.1	16
Bottom fish	1316.7	76	36.7	63	6.7	51	103.3	67	16.7	53	22.9	129*
Troll-bottom	3743.3	46	273.3	54	16.7	47	804.4	61	46.7	54	17.0	46*
Total:	20273.9	28	676.4	34	69.6	28	1963.1	36	202.0	28	33.9	19

* Not enough data to properly compute Coefficient of Variation (CV).

Table II.4.10

Tutuila October 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	19944.1	28	492.2	28	75.2	30	1546.2	32	236.0	35	43.4	17
Bottom fish	2713.2	46	125.8	47	13.6	46	350.0	49	37.4	47	23.8	82*
Troll-bottom	3027.4	57	133.7	49	6.9	49	709.7	55	37.7	57	23.6	77*
Spearing	921.1	61	37.5	56	6.8	56	136.8	63	23.9	61	23.8	0*
Total:	26605.8	27	789.3	22	102.5	25	2742.8	26	335.0	28	32.2	15

Table II.4.11

Tutuila November 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	21923.3	23	742.1	17	112.8	17	2489.6	17	373.7	17	27.5	20
Bottom fish	6293.0	40	363.9	37	35.3	32	919.3	36	92.5	34	15.6	10
Troll-bottom	1828.6	53	69.2	44	10.5	41	213.5	43	39.8	50	23.2	70*
Spearing	1992.5	52	67.7	52	7.5	52	338.3	52	37.6	52	30.0	25*
Total:	32037.4	19	1242.9	16	162.4	14	3960.8	16	536.1	14	27.5	16

Table II.4.12

Tutuila December 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	cpue	cv
Trolling	26532.9	18	441.4	19	61.2	19	1474.8	23	204.9	23	65.6	14
Troll-bottom	3875.3	66	68.8	56	7.2	53	137.5	56	14.5	53	70.7	111*
Total:	30408.2	21	510.2	20	68.4	20	1612.3	23	219.4	23	66.5	14

* Not enough data to properly compute Coefficient of Variation (CV).

Table II.5.1

Tutuila January 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Jacks	23.4	0.08	Barracudas	54.7	0.20
Small barracuda	42.4	0.15	Sharks	91.6	0.33
Eels	35.8	0.13	Bottom fish	5587.2	19.99
Groupers	36.0	0.13	Lunartail grouper	5.0	0.02
Blue lined snapper	62.5	0.22	Twinspot/red snapper	12.6	0.05
Gray jobfish	96.9	0.35	Longnose emperor	159.6	0.57
Reef fish	731.0	2.62	Lined surgeon	1050.3	3.76
Yellow eyed surgeon	373.7	1.34	Convict tang	18.0	0.06
Unicornfish (misc)	320.5	1.15	Parrotfish	311.0	1.11
Wrasse	64.8	0.23	Dolphin (mahimahi)	290.7	1.04
Blue marlin	991.7	3.55	Rainbow runner	65.0	0.23
Skipjack tuna	5008.0	17.92	Yellowfin tuna	8094.0	28.96
Spiny lobster	1342.8	4.80	Octopus	49.5	0.18
Squid	5.7	0.02	Giant clam	3028.9	10.84
Total all species:	27953.3	100.00			

Table II.5.2

Tutuila February 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Jacks	300.5	0.58	Black jack	129.7	0.25
Barracudas	674.9	1.31	Small barracuda	60.8	0.12
Sharks	118.0	0.23	Eels	206.0	0.40
Bottom fish	11942.3	23.17	Flagtail grouper	86.9	0.17
Blue lined snapper	241.6	0.47	Blood snapper	175.5	0.34
Brown jobfish	219.2	0.43	Opakapaka	291.7	0.57
Onaga (red snapper)	60.8	0.12	Emperors (misc)	101.3	0.20
Ambon emperor	444.2	0.86	Orangespot emperor	124.7	0.24
Reef fish	1399.5	2.72	Lined surgeon	1116.8	2.17
Yellow eyed surgeon	130.9	0.25	Unicornfish (misc)	966.6	1.88
Unicornfish	57.8	0.11	Parrotfish	311.9	0.61
Wrasse	473.7	0.92	Inshore groupers	17.3	0.03
Blue marlin	6438.6	12.49	Rainbow runner	99.9	0.19
Wahoo	153.2	0.30	Tunas	536.2	1.04
Skipjack tuna	14112.0	27.38	Dogtooth tuna	251.4	0.49
Yellowfin tuna	7899.9	15.33	Kawakawa	29.3	0.06
Spiny lobster	2133.9	4.14	Octopus	94.5	0.18
Giant clam	130.9	0.25			
Total all species:	51532.4	100.00			

Table II.5.3

Tutuila March 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Bigeye scad	225.4	0.88	Black jack	162.5	0.63
Barracudas	77.7	0.30	Sharks	174.9	0.68
Bottom fish	5150.8	20.09	Groupers	63.3	0.25
Peacock grouper	15.8	0.06	Lunartail grouper	93.2	0.36
Blue lined snapper	352.0	1.37	Humpback snapper	127.4	0.50
Opakapaka	156.1	0.61	Lehi (silverjaw)	127.4	0.50
Onaga (red snapper)	60.5	0.24	Longnose emperor	149.7	0.58
Redgill emperor	715.1	2.79	Reef fish	1916.4	7.48
Lined surgeon	3009.1	11.74	Yellow eyed surgeon	728.7	2.84
Dussumier's surgeon	94.6	0.37	Unicornfish (misc)	135.6	0.53
Unicornfish	417.2	1.63	Squirrelfish	211.7	0.83
Berndt's soldierfish	17.4	0.07	Parrotfish	1048.1	4.09
Dolphin (mahimahi)	354.6	1.38	Blue marlin	2164.7	8.44
Rainbow runner	46.5	0.18	Wahoo	375.8	1.47
Skipjack tuna	841.1	3.28	Dogtooth tuna	184.8	0.72
Albacore	551.5	2.15	Yellowfin tuna	5035.8	19.64
Kawakawa	186.0	0.73	Spiny lobster	621.4	2.42
Giant clam	44.2	0.17			
Total all species:	25636.8	100.00			

Table II.5.4

Tutuila April 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Bigeye scad	28.6	0.22	Black jack	57.1	0.43
Small barracuda	58.7	0.44	Peacock grouper	226.7	1.71
Lunartail grouper	55.9	0.42	Blue lined snapper	786.9	5.95
Onespot snapper	11.4	0.09	Humpback snapper	80.0	0.60
Gray jobfish	199.8	1.51	Lehi (silverjaw)	105.7	0.80
Onaga (red snapper)	17.1	0.13	Stone's snapper	28.6	0.22
Bigeye emperor	8.6	0.06	Longnose emperor	142.9	1.08
Redgill emperor	663.6	5.02	Reef fish	1176.0	8.89
Lined surgeon	2082.7	15.75	Yellow eyed surgeon	600.2	4.54
Spotted surgeonfish	6.5	0.05	Unicornfish (misc)	178.4	1.35
Unicornfish	802.9	6.07	Berndt's soldierfish	266.0	2.01
Bigeye squirrelfish	32.4	0.25	Parrotfish	1365.9	10.33
Wahoo	93.2	0.70	Skipjack tuna	1073.5	8.12
Dogtooth tuna	28.6	0.22	Albacore	1344.3	10.16
Yellowfin tuna	407.8	3.08	Spiny lobster	1296.0	9.80
Total all species:	13226.2	100.00			

Table II.5.5

Tutuila May 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Bigeye scad	919.7	9.16	Black jack	312.7	3.11
Barracudas	38.1	0.38	Peacock grouper	108.7	1.08
Lunartail grouper	34.6	0.34	Blue lined snapper	689.2	6.86
Humpback snapper	78.1	0.78	Lehi (silverjaw)	1032.5	10.28
Onaga (red snapper)	948.5	9.45	Ehu (red snapper)	597.8	5.95
Redgill emperor	706.5	7.04	Rudderfish	25.6	0.25
Lined surgeon	1455.4	14.49	Yellow eyed surgeon	181.3	1.81
Unicornfish	162.7	1.62	Parrotfish	1046.2	10.42
Dolphin (mahimahi)	261.9	2.61	Wahoo	71.4	0.71
Skipjack tuna	761.9	7.59	Dogtooth tuna	142.9	1.42
Yellowfin tuna	190.5	1.90	Spiny lobster	275.5	2.74
Total all species:	10041.8	100.00			

Table II.5.6

Tutuila June 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Barracudas	11.0	0.04	Large barracuda	40.8	0.14
Groupers	94.7	0.32	Peacock grouper	76.1	0.26
Flagtail grouper	206.9	0.70	Lunartail grouper	233.9	0.80
Blue lined snapper	548.1	1.87	Gray jobfish	107.3	0.37
Lehi (silverjaw)	271.8	0.93	Onaga (red snapper)	199.3	0.68
Ehu (red snapper)	592.7	2.02	Stone's snapper	9.1	0.03
Bigeye emperor	152.2	0.52	Longnose emperor	525.4	1.79
Ambon emperor	183.1	0.62	Lined surgeon	235.6	0.80
Yellow eyed surgeon	126.8	0.43	Squirrelfish	165.0	0.56
Parrotfish	159.5	0.54	Dolphin (mahimahi)	2131.4	7.25
Sailfish	77.4	0.26	Rainbow runner	112.9	0.38
Wahoo	221.2	0.75	Skipjack tuna	16656.0	56.69
Dogtooth tuna	289.9	0.99	Yellowfin tuna	5829.0	19.84
Kawakawa	17.6	0.06	Spiny lobster	105.1	0.36
Total all species:	29379.9	100.00			

Table II.5.7

Tutuila July 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Black jack	190.0	0.77	Barracudas	139.7	0.57
Sharks	85.4	0.35	Bottom fish	1081.6	4.41
Groupers	95.4	0.39	Lunartail grouper	27.2	0.11
Blue lined snapper	259.2	1.06	Gray jobfish	30.7	0.13
Lehi (silverjaw)	153.5	0.63	Ehu (red snapper)	119.5	0.49
Longnose emperor	508.1	2.07	Redgill emperor	163.5	0.67
Reef fish	6.8	0.03	Rabbitfish	10.2	0.04
Lined surgeon	556.1	2.27	Yellow eyed surgeon	91.8	0.37
Unicornfish (misc)	289.1	1.18	Unicornfish	306.1	1.25
Squirrelfish	50.2	0.20	Bigeye squirrelfish	8.5	0.03
Parrotfish	168.4	0.69	Dolphin (mahimahi)	1457.2	5.94
Rainbow runner	17.0	0.07	Wahoo	231.0	0.94
Skipjack tuna	17914.9	72.98	Dogtooth tuna	104.2	0.42
Yellowfin tuna	299.1	1.22	Kawakawa	47.6	0.19
Spiny lobster	136.1	0.55			
Total all species:	24548.0	100.00			

Table II.5.8

Tutuila August 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Jacks	104.1	0.34	Black jack	95.4	0.31
Barracudas	249.7	0.81	Sharks	2372.2	7.72
Groupers	86.9	0.28	Peacock grouper	137.5	0.45
Spotted grouper	279.9	0.91	Giant grouper	46.6	0.15
Lunartail grouper	497.9	1.62	Blue lined snapper	1092.4	3.56
Twinspot/red snapper	107.7	0.35	Humpback snapper	111.0	0.36
Gray jobfish	147.6	0.48	Deepwater bottomfish	517.7	1.69
Lehi (silverjaw)	240.3	0.78	Onaga (red snapper)	45.8	0.15
Stone's snapper	239.1	0.78	Longnose emperor	717.3	2.33
Lined surgeon	141.1	0.46	Yellow eyed surgeon	68.7	0.22
Unicornfish (misc)	115.6	0.38	Unicornfish	57.2	0.19
Squirrelfish	19.1	0.06	Parrotfish	76.3	0.25
Dolphin (mahimahi)	1396.9	4.55	Wahoo	93.3	0.30
Skipjack tuna	18633.0	60.65	Dogtooth tuna	95.4	0.31
Yellowfin tuna	2756.9	8.97	Kawakawa	121.7	0.40
Spiny lobster	57.2	0.19			
Total all species:	30721.5	100.00			

Table II.5.9

Tutuila September 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Black jack	50.0	0.25	Barracudas	10.0	0.05
Small barracuda	13.3	0.07	Groupers	341.7	1.69
Lunartail grouper	643.3	3.17	Blue lined snapper	588.3	2.90
Humpback snapper	33.3	0.16	Gray jobfish	26.7	0.13
Opakapaka	300.0	1.48	Ehu (red snapper)	300.0	1.48
Stone's snapper	16.7	0.08	Emperors (misc)	60.0	0.30
Longnose emperor	440.0	2.17	Blueline bream	133.3	0.66
Orangespot emperor	50.0	0.25	Redgill emperor	331.7	1.64
Squirrelfish	245.0	1.21	Dolphin (mahimahi)	246.6	1.22
Sailfish	249.8	1.23	Wahoo	63.3	0.31
Skipjack tuna	12709.0	62.69	Dogtooth tuna	400.0	1.97
Yellowfin tuna	3021.8	14.90			
Total all species:	20273.9	100.00			

Table II.5.10

Tutuila October 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Jacks	84.9	0.32	Black jack	279.2	1.05
Small barracuda	410.5	1.54	Sharks	634.5	2.38
Groupers	51.4	0.19	Striped grouper	51.0	0.19
Lunartail grouper	388.4	1.46	Blue lined snapper	358.2	1.35
Twinspot/red snapper	318.4	1.20	Humpback snapper	17.0	0.06
Gray jobfish	227.7	0.86	Blue lined gindai	154.3	0.58
Lehi (silverjaw)	220.9	0.83	Onaga (red snapper)	187.7	0.71
Ehu (red snapper)	122.3	0.46	Stone's snapper	154.3	0.58
Emperors (misc)	44.2	0.17	Longnose emperor	620.9	2.33
Orangespot emperor	403.8	1.52	Lined surgeon	270.0	1.01
Yellow eyed surgeon	153.8	0.58	Spotted surgeonfish	29.1	0.11
Unicornfish	112.8	0.42	Squirrelfish	170.0	0.64
Parrotfish	191.4	0.72	Wrasse	27.4	0.10
Inshore groupers	109.5	0.41	Dolphin (mahimahi)	449.9	1.69
Sailfish	51.3	0.19	Rainbow runner	222.9	0.84
Wahoo	153.9	0.58	Skipjack tuna	15899.3	59.76
Dogtooth tuna	62.9	0.24	Yellowfin tuna	3739.5	14.06
Kawakawa	160.9	0.60	Spiny lobster	71.8	0.27
Total all species:	26605.8	100.00			

Table II.5.11

Tutuila November 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Jacks	83.6	0.26	Black jack	264.2	0.82
Small barracuda	31.9	0.10	Sharks	173.9	0.54
Groupers	107.0	0.33	Peacock grouper	94.0	0.29
Flagtail grouper	207.4	0.65	Lunartail grouper	857.2	2.68
Blue lined snapper	1129.7	3.53	Twinspot/red snapper	36.8	0.11
Humpback snapper	67.7	0.21	Gray jobfish	388.0	1.21
Opakapaka	262.6	0.82	Gindai (flower snap)	430.8	1.34
Lehi (silverjaw)	192.8	0.60	Onaga (red snapper)	217.4	0.68
Longnose emperor	687.2	2.15	Ambon emperor	492.7	1.54
Orangespot emperor	271.0	0.85	Redgill emperor	602.1	1.88
Lined surgeon	646.6	2.02	Yellow eyed surgeon	439.8	1.37
Unicornfish (misc)	169.2	0.53	Unicornfish	78.9	0.25
Squirrelfish	446.8	1.39	Saber squirrelfish	184.0	0.57
Berndt's soldierfish	150.5	0.47	Parrotfish	244.4	0.76
Inshore groupers	184.0	0.57	Dolphin (mahimahi)	353.5	1.10
Rainbow runner	55.3	0.17	Wahoo	104.0	0.32
Skipjack tuna	17600.1	54.94	Yellowfin tuna	4488.6	14.01
Kawakawa	41.5	0.13	Spiny lobster	251.9	0.79
Total all species:	32037.4	100.00			

Table II.5.12

Tutuila December 1988
Offshore Creel Survey Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Black jack	434.2	1.43	Flagtail grouper	152.0	0.50
Lunartail grouper	289.5	0.95	Blue lined snapper	463.2	1.52
Humpback snapper	108.6	0.36	Ehu (red snapper)	137.5	0.45
Emperors (misc)	343.8	1.13	Longnose emperor	166.4	0.55
Squirrelfish	144.7	0.48	Dolphin (mahimahi)	86.4	0.28
Wahoo	158.9	0.52	Skipjack tuna	25026.7	82.30
Dogtooth tuna	723.7	2.38	Yellowfin tuna	2120.9	6.97
Kawakawa	51.8	0.17			
Total all species:	30408.2	100.00			

Figure II.5.1

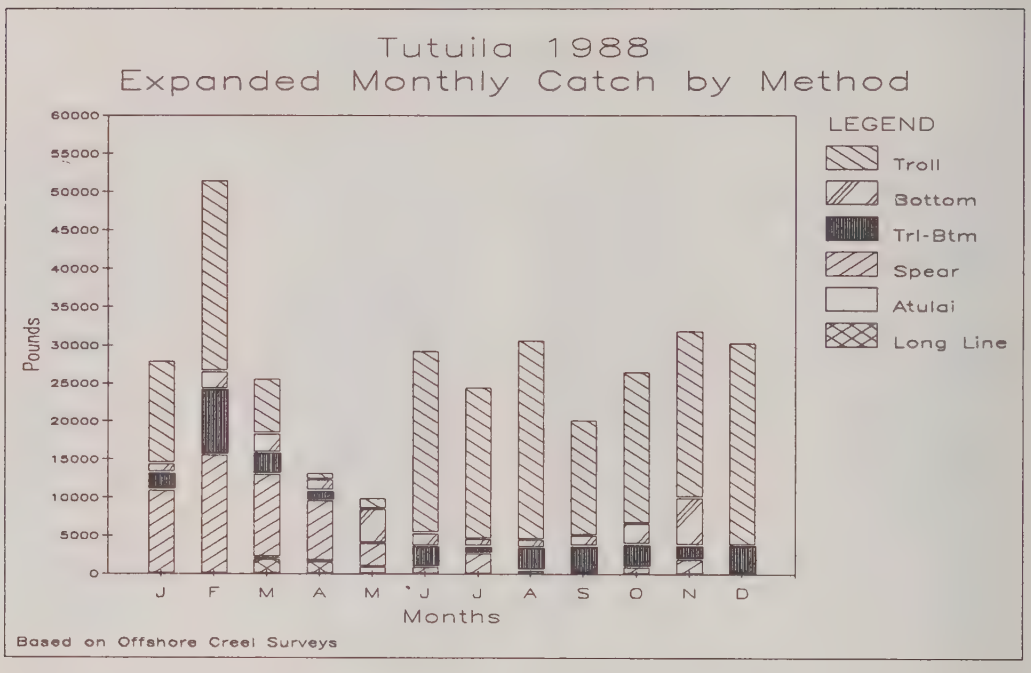


Figure II.5.2

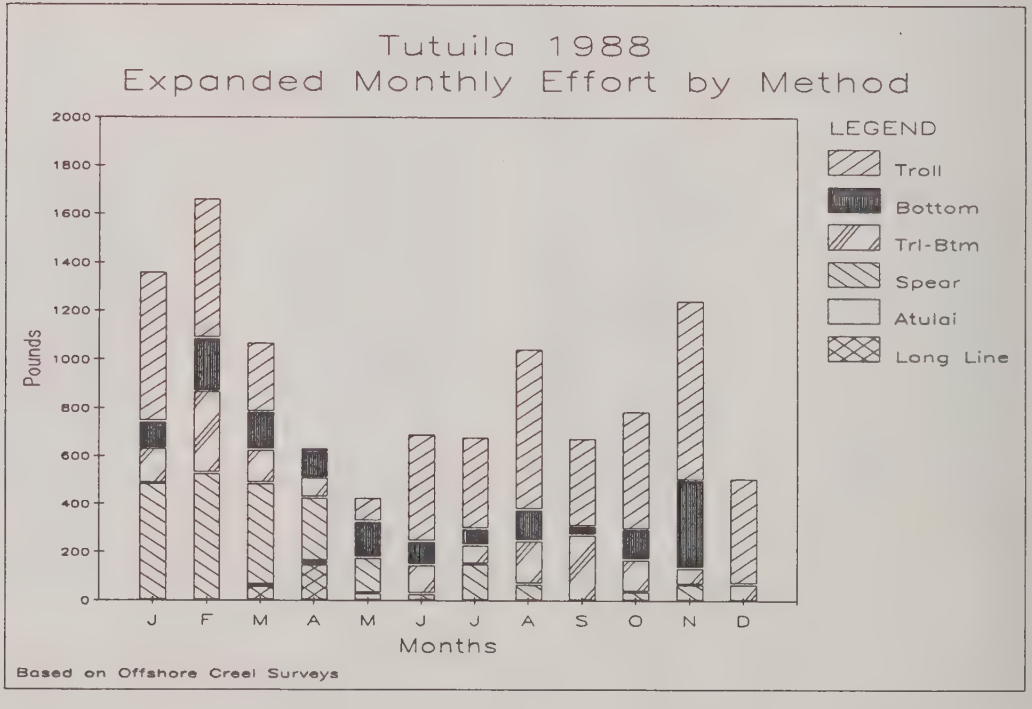
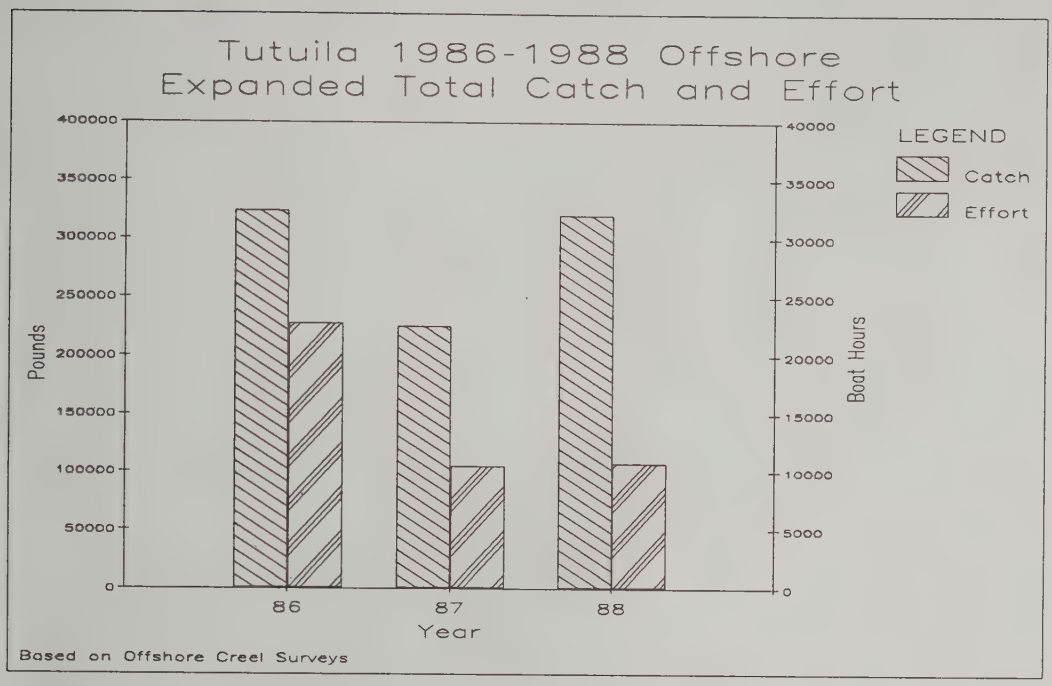


Figure II.5.3


Tutuila 1986-1988 Offshore
Expanded Total Catch and Effort
Pounds
400000
350000
300000
250000
200000
150000
100000
50000
0
Boat Hours
40000
35000
30000
25000
20000
15000
10000
5000
0
LEGEND
Catch
Effort
86
87
88
Year
Based on Offshore Creel Surveys

Commonwealth of the Northern Mariana Islands

Fishery Statistics 1988

COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS
1988 FISHERY STATISTICS

Compiled by

Division of Fish and Wildlife

and the

Western Pacific Fishery Information Network

May 1990

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COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS
1988 FISHERY STATISTICS

INTRODUCTION

The Commonwealth of the Northern Mariana Islands (CNMI) comprises a string of islands located at about long. 145° E and extending northward from about lat. 14 to 21° N. About 99% of the approximately 21,000 inhabitants of the CNMI live on the three main islands, Saipan (87%), Rota (7%), and Tinian (5%). The Division of Fish and Wildlife (DFW) has been collecting fishery statistics on the commercial fishing fleet of Saipan since the mid-1970's. In 1983, DFW also began collecting information on vessels transshipping tuna out of Tinian. Significant improvements to the data collecting and processing systems were made in 1982 when microcomputer hardware, software, and training were provided by the WPACFIN program.

The major domestic commercial fishery of the CNMI is a small boat, one-day troll fishery. Most of the boats are 12- to 24-foot outboard-powered, runabout-type vessels; however, a few larger boats are also used. In the past few years, there has been a fairly rapid increase in the number of boats in the CNMI, about 70% of which are used in the commercial fisheries. Although trolling is by far the most common fishing method, many boats are also used for bottom fishing and reef fishing activities. Reef fish are an important component of the local diet and are a significant portion of the total commercial catch. Additionally, an increasing amount of reef fish is being imported from other Pacific islands to meet the local demand. In recent years, several larger boats have started fishing more intensively for bottom fish around the islands north of Saipan. The vast majority of the domestic catch is consumed locally, but there have been some exports of fish to Guam and Hawaii.

Beginning in 1983, fishing vessels from several nations began using the Tinian harbor as a port to off-load tuna catches to large transshipment vessels. The DFW began collecting statistics on these activities in February 1983. From 1983 to 1988, transshipments out of Tinian were 53,000, 114,000, 69,000, 73,000, 58,000 and 64,000 metric tons, respectively. None of the vessels involved in the transshipments is CNMI vessels; however, many of them are U.S. registered purse seiners. The proportion of transshipments made by American vessels declined steadily from over 75% in 1983 to only 43% in 1987 but increased in 1988 to 65% of total transshipments. The number of U.S. vessels making transshipments also declined from a high of about 40 in 1984 to about 12-14 in 1986, about 16 in 1987, and 13 in 1988.

DATA COLLECTING SYSTEM

The principal method used by DFW to collect domestic commercial fisheries data is a dealer invoicing system, sometimes referred to as a "trip ticket" system. The DFW provides numbered two-part invoices to all purchasers of fresh fishery products, including hotels, restaurants, stores, fish markets, and roadside vendors. Dealers complete an invoice each time they purchase fish directly from fishermen. They keep one copy for their records and provide one copy to DFW. Some advantages of this method of data collection are that it is relatively inexpensive to implement and maintain, nearly complete coverage of the commercial fisheries is fairly easy to accomplish, and DFW can provide feedback to dealers and fishermen to ensure data accuracy and continued cooperation. Disadvantages include a dependence on non-DFW personnel to identify the catch and record the data, the types of data that can be collected are somewhat restricted, education and cooperation of all fish purchasers are required, and only the fish that are actually sold to dealers are recorded and a potentially important portion of the total landings is unrecorded. Since 1982, DFW has tried to minimize these disadvantages as much as possible by maintaining a close working relationship with dealers, by educating and adding new dealers to their list as they enter the business, and by implementing a creel survey to help estimate total catch, including recreational and subsistence catch.

The current system collects data from dealers on the island of Saipan, where DFW estimates over 90% of all CNMI commercial landings are made. The DFW further estimates that the proportion of total commercial landings that is recorded in the data base for Saipan since 1983 is over 90%.

Information collected for each commercial purchase of fish from the fishermen includes the following:

Date
Buyer's name (dealer)
Seller's name (fisherman)
Species
Weight (pounds)
Price per pound
Value
Invoice number

All of these data elements are collected for all purchases of fishery products; however, species identification is frequently made only to a group level, especially for reef fish.

DATA PROCESSING SYSTEM

At the beginning of each month, a DFW employee visits each of the dealers on Saipan to obtain the previous month's invoices, resolve problems, and answer any questions the dealer may have.

The invoices are returned to the office for an initial visual edit during the coding process, and are then entered into the "Purchase" data base on the microcomputer. After the records are entered, reports are generated to help verify that all data were entered correctly. On a quarterly basis, copies of the data base are sent to the Honolulu Laboratory, where the data are translated into a different format and transferred to the central computer for additional editing and verification before generation of summary reports. These reports and data bases are then ready for use by qualified WPACFIN participants.

DATA REPORTING SYSTEM

After all editing and quality control activities have been accomplished, monthly and annual summary reports by species are generated. Each of the following reports for 1988 contains information on the pounds, value, average price per pound, and number of recorded landings for each species or species groups. The number of recorded landings ("RECORDS" in the tables) is a measurement of how many times each species was landed, regardless of the number or weight of the fish in the landing. This statistic is provided to give an indication of the frequency each species is reported. The POUNDS can be divided by the RECORDS for the average weight of each landing. Each monthly report contains a subtotal for the sum of all species for that month, and the December report also includes the annual total. Annual reports contain the total landings for each species and the total recorded landings for all species for the calendar year.

The following species, species groups, and abbreviations are used in the tables and graphs of CNMI's data:

I. Pelagic Management Unit Species (PMUS)

- Dolphin (mahimahi)
- Marlin
- Shortbill spearfish
- Sailfish
- Wahoo
- Sharks

II. Bottomfish Management Unit Species (BMUS)

- Jacks (unclassified, but excluding bigeye scad)
- Bottom fish (unclassified)
- Ehu (red snapper)
- Gindai (flower snapper)
- Grouper (unclassified)
- Kalikali (pink snapper)
- Lehi (silverjaw snapper)
- Onaga (red or longtail snapper)
- Opakapaka (pink snapper)
- Uku (gray snapper)
- Emperorfish

III. Billfish

Marlin (probably all blue marlin but could also include the rarely landed striped and black marlin)
Shortbill spearfish
Sailfish

IV. Tunas

Tunas (unclassified)
Skipjack tuna
Yellowfin tuna
Dogtooth tuna

V. Other Tuna

The above tunas excluding skipjack and yellowfin tuna

VI. Fisheries Categories

A. Pelagics

All PMUS and tuna species plus the following:
Troll fish (unclassified)
Barracuda
Rainbow runner

B. Bottom Fish

Same as BMUS

C. Reef Fish

Reef fish (unclassified)
Giant wrasse
Rabbitfish (hitting, hitting feda, menahac, and sesjun)
Rudderfish
Squirrelfish
Parrotfish
Snapper
Surgeonfish
Unicornfish
Goatfish

D. Other

Miscellaneous
Bigeye scad
Mullet
Eels
Milkfish
Invertebrates (unclassified)
Crabs (unclassified)
Coconut crab
Lobster
Shrimp
Octopus
Squid
Turtle
Seaweeds
Imported

Table III.1.1

CNMI 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	22	1,472.00	2,576.40	1.75
Bottom fish	205	33,458.00	58,686.16	1.75
Gindai (flower snap)	1	68.00	119.00	1.75
Onaga (red snapper)	19	1,601.00	4,819.50	3.01
Opakapaka (pink snp)	6	261.00	676.30	2.59
Reef fish	617	102,883.52	161,132.56	1.57
Wrasse	2	68.60	77.30	1.13
Rabbitfish (hitting)	237	5,322.75	10,269.15	1.93
Rudderfish (guilli)	2	66.00	115.20	1.75
Emperor (mafute)	12	2,462.00	4,750.95	1.93
Parrotfish	60	10,467.00	16,658.00	1.59
Surgeonfish	44	8,138.00	12,904.90	1.59
Unicornfish	13	3,988.00	6,370.75	1.60
Goatfish	5	185.75	363.45	1.96
Barracuda	5	269.50	273.85	1.02
Dolphin (mahimahi)	261	24,638.93	34,069.07	1.38
Marlin	8	1,047.00	1,225.50	1.17
Rainbow runner	31	3,483.00	4,358.05	1.25
Wahoo	105	9,357.84	12,466.38	1.33
Skipjack tuna	1,129	213,197.85	253,235.64	1.19
Dogtooth tuna	32	3,324.50	4,188.60	1.26
Yellowfin tuna	145	12,299.89	17,442.87	1.42
Lobster	112	3,766.75	14,615.75	3.88
Octopus	8	500.00	567.65	1.14
** TOTAL **	3,081	442,326.88	621,962.98	

Table III.1.2

CNMI January 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	16	3,535.50	6,032.38	1.71
Reef fish	37	4,701.02	7,400.41	1.57
Rabbitfish (hitting)	19	897.00	1,906.25	2.13
Emperor (mafute)	1	115.00	258.75	2.25
Parrotfish	1	296.00	488.40	1.65
Surgeonfish	3	558.00	920.70	1.65
Barracuda	2	220.50	220.50	1.00
Dolphin (mahimahi)	46	3,828.93	5,513.39	1.44
Wahoo	3	100.00	124.85	1.25
Skipjack tuna	51	9,180.10	12,012.74	1.31
Dogtooth tuna	1	44.00	48.40	1.10
Yellowfin tuna	8	871.50	1,134.60	1.30
Lobster	9	78.50	235.50	3.00
Octopus	1	7.00	10.50	1.50
** SUBTOTAL **	198	24,433.05	36,307.37	

Table III.1.3

CNMI February 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	3	153.00	303.00	1.98
Bottom fish	17	3,639.00	6,268.15	1.72
Onaga (red snapper)	1	38.00	152.00	4.00
Reef fish	48	7,887.00	12,514.70	1.59
Rabbitfish (hitting)	16	164.25	328.50	2.00
Surgeonfish	6	1,896.00	3,128.40	1.65
Goatfish	1	103.00	206.00	2.00
Dolphin (mahimahi)	52	7,605.75	10,491.41	1.38
Marlin	1	22.00	35.20	1.60
Wahoo	7	399.84	675.23	1.69
Skipjack tuna	51	6,788.25	9,165.98	1.35
Dogtooth tuna	3	294.50	323.95	1.10
Yellowfin tuna	16	1,367.39	2,079.42	1.52
Lobster	6	110.00	484.00	4.40
Octopus	2	376.00	376.90	1.00
** SUBTOTAL **	230	30,843.98	46,532.84	

Table III.1.4

CNMI March 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	13	3,183.00	5,868.30	1.84
Onaga (red snapper)	2	130.00	373.00	2.87
Reef fish	49	9,003.75	14,463.90	1.61
Rabbitfish (hitting)	18	399.50	738.45	1.85
Parrotfish	1	493.00	813.45	1.65
Surgeonfish	3	516.00	859.10	1.66
Unicornfish	1	356.00	587.40	1.65
Dolphin (mahimahi)	86	8,368.25	11,523.32	1.38
Wahoo	8	1,424.00	1,946.90	1.37
Skipjack tuna	97	12,793.00	17,407.49	1.36
Yellowfin tuna	20	1,330.00	1,852.40	1.39
Lobster	1	69.00	207.00	3.00
** SUBTOTAL **	299	38,065.50	56,640.71	

Table III.1.5

CNMI April 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	3	134.00	255.90	1.91
Bottom fish	27	3,216.00	5,622.75	1.75
Onaga (red snapper)	3	94.00	313.00	3.33
Opakapaka (pink snp)	1	11.00	27.50	2.50
Reef fish	39	5,900.00	9,315.05	1.58
Rabbitfish (hitting)	13	329.00	637.00	1.94
Parrotfish	1	398.00	656.70	1.65
Surgeonfish	2	611.00	1,008.15	1.65
Unicornfish	2	532.00	877.80	1.65
Dolphin (mahimahi)	46	3,186.00	4,304.75	1.35
Wahoo	23	2,568.00	3,388.90	1.32
Skipjack tuna	114	21,679.00	28,491.80	1.31
Dogtooth tuna	2	315.00	504.00	1.60
Yellowfin tuna	8	478.00	807.30	1.69
Lobster	8	115.00	345.00	3.00
Octopus	2	73.00	109.50	1.50
** SUBTOTAL **	294	39,639.00	56,665.10	

Table III.1.6

CNMI May 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	1	250.00	400.00	1.60
Bottom fish	17	3,494.50	6,255.68	1.79
Onaga (red snapper)	1	55.00	275.00	5.00
Reef fish	67	10,116.00	15,351.50	1.52
Rabbitfish (hitting)	13	118.00	236.00	2.00
Emperor (mafute)	1	19.00	30.40	1.60
Dolphin (mahimahi)	17	741.00	1,027.65	1.39
Rainbow runner	1	185.00	185.00	1.00
Wahoo	6	625.00	741.85	1.19
Skipjack tuna	122	24,533.50	27,613.67	1.13
Dogtooth tuna	5	170.00	269.30	1.58
Yellowfin tuna	7	376.00	455.75	1.21
Lobster	27	735.50	2,241.00	3.05
** SUBTOTAL **	285	41,418.50	55,082.80	

Table III.1.7

CNMI June 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	6	382.00	668.50	1.75
Bottom fish	21	3,339.00	5,957.50	1.78
Onaga (red snapper)	3	739.00	1,517.00	2.05
Opakapaka (pink snp)	1	12.00	24.00	2.00
Reef fish	63	9,192.00	14,734.25	1.60
Rabbitfish (hitting)	12	294.00	525.70	1.79
Parrotfish	3	1,148.00	1,894.20	1.65
Surgeonfish	3	848.00	1,399.20	1.65
Unicornfish	2	705.00	1,163.25	1.65
Goatfish	1	23.00	40.25	1.75
Dolphin (mahimahi)	1	49.00	78.40	1.60
Marlin	2	215.00	317.00	1.47
Rainbow runner	2	256.00	289.60	1.13
Wahoo	11	662.00	805.10	1.22
Skipjack tuna	123	24,501.00	27,905.50	1.14
Dogtooth tuna	4	1,038.00	1,061.70	1.02
Yellowfin tuna	14	1,828.00	2,612.45	1.43
Lobster	4	125.00	545.00	4.36
Octopus	3	44.00	70.75	1.61
** SUBTOTAL **	279	45,400.00	61,609.35	

Table III.1.8

CNMI July 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	5	310.00	542.50	1.75
Bottom fish	14	2,233.00	3,936.70	1.76
Reef fish	43	7,445.00	11,932.05	1.60
Rabbitfish (hitting)	15	169.00	338.00	2.00
Rudderfish (guilli)	1	24.00	48.00	2.00
Parrotfish	5	1,660.00	2,739.00	1.65
Surgeonfish	1	463.00	763.95	1.65
Unicornfish	1	401.00	661.65	1.65
Marlin	1	350.00	262.50	0.75
Rainbow runner	5	485.00	557.75	1.15
Wahoo	9	707.00	823.55	1.16
Skipjack tuna	117	25,056.50	27,950.00	1.12
Dogtooth tuna	1	40.00	40.00	1.00
Yellowfin tuna	11	878.00	1,035.20	1.18
Lobster	21	986.00	4,175.50	4.23
** SUBTOTAL **	250	41,207.50	55,806.35	

Table III.1.9

CNMI August 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	1	52.00	91.00	1.75
Bottom fish	26	4,528.00	7,551.80	1.67
Gindai (flower snap)	1	68.00	119.00	1.75
Onaga (red snapper)	3	146.00	471.00	3.23
Opakapaka (pink snp)	2	82.00	197.00	2.40
Reef fish	64	12,506.25	19,616.60	1.57
Rabbitfish (hitting)	21	426.75	785.50	1.84
Emperor (mafute)	3	455.00	870.25	1.91
Parrotfish	1	383.00	631.95	1.65
Surgeonfish	2	474.00	782.10	1.65
Unicornfish	1	493.00	813.45	1.65
Rainbow runner	12	1,189.00	1,501.00	1.26
Wahoo	1	40.00	60.00	1.50
Skipjack tuna	138	32,925.50	36,894.93	1.12
Dogtooth tuna	5	500.00	491.00	0.98
Yellowfin tuna	12	1,206.00	1,689.00	1.40
Lobster	12	736.25	3,178.75	4.32
** SUBTOTAL **	305	56,210.75	75,744.33	

Table III.1.10

CNMI September 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	17	1,712.00	3,069.55	1.79
Onaga (red snapper)	3	269.00	1,153.50	4.29
Opakapaka (pink snp)	1	108.00	307.80	2.85
Reef fish	54	7,753.50	11,926.50	1.54
Wrasse	2	68.60	77.30	1.13
Rabbitfish (hitting)	20	479.25	902.55	1.88
Emperor (mafute)	2	309.00	585.80	1.90
Parrotfish	5	1,710.00	2,800.20	1.64
Surgeonfish	4	442.00	569.40	1.29
Unicornfish	1	31.00	35.65	1.15
Goatfish	1	5.75	9.20	1.60
Barracuda	1	27.00	31.05	1.15
Rainbow runner	3	328.00	416.20	1.27
Wahoo	6	289.00	391.80	1.36
Skipjack tuna	79	13,487.00	14,662.28	1.09
Dogtooth tuna	10	836.00	1,345.85	1.61
Yellowfin tuna	9	721.00	1,077.35	1.49
Lobster	18	651.50	2,586.00	3.97
** SUBTOTAL **	236	29,227.60	41,947.98	

Table III.1.11

CNMI October 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	2	138.00	222.75	1.61
Bottom fish	9	1,485.00	2,572.50	1.73
Onaga (red snapper)	2	95.00	355.00	3.74
Reef fish	55	12,087.00	18,849.40	1.56
Rabbitfish (hitting)	29	467.00	885.60	1.90
Emperor (mafute)	3	1,444.00	2,730.75	1.89
Parrotfish	10	1,280.00	1,924.00	1.50
Surgeonfish	14	1,010.00	1,334.60	1.32
Unicornfish	3	612.00	978.60	1.60
Goatfish	1	16.00	32.00	2.00
Barracuda	2	22.00	22.30	1.01
Dolphin (mahimahi)	2	105.00	130.25	1.24
Marlin	1	144.00	172.80	1.20
Rainbow runner	4	185.00	212.75	1.15
Wahoo	13	1,211.00	1,627.00	1.34
Skipjack tuna	110	19,856.00	23,243.80	1.17
Yellowfin tuna	14	1,167.00	1,841.95	1.58
Lobster	5	156.00	606.00	3.88
** SUBTOTAL **	279	41,480.00	57,742.05	

Table III.1.12

CNMI November 1988 Commercial Landings

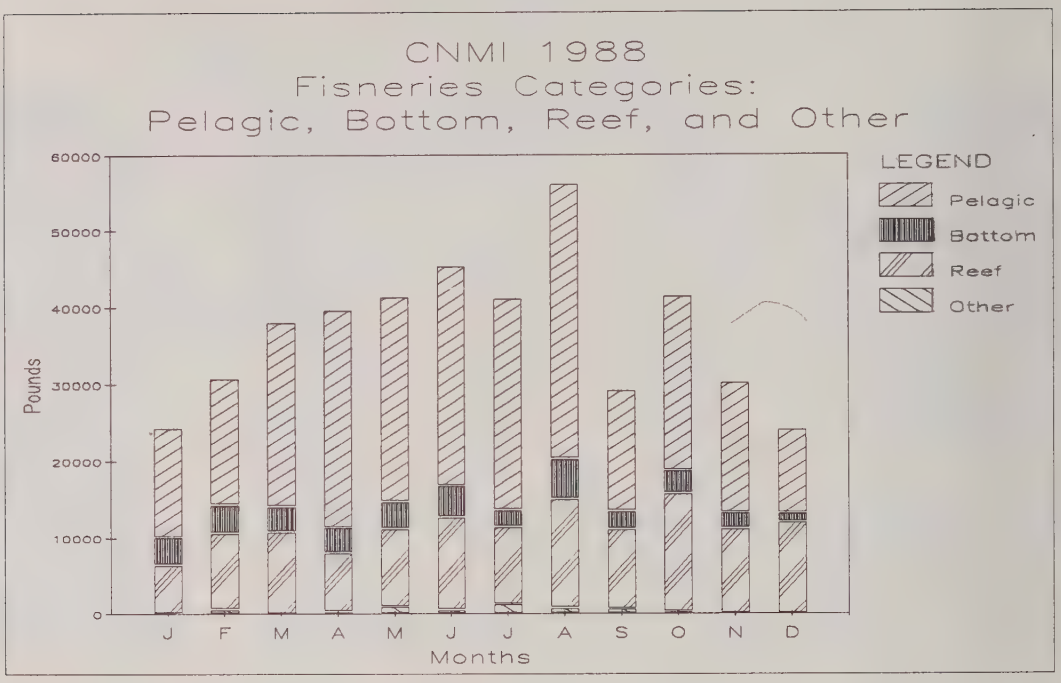
Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	1	53.00	92.75	1.75
Bottom fish	15	2,109.00	3,690.75	1.75
Reef fish	45	7,560.00	11,629.50	1.54
Rabbitfish (hitting)	21	458.00	914.00	2.00
Rudderfish (guilli)	1	42.00	67.20	1.60
Parrotfish	12	1,151.00	1,666.05	1.45
Surgeonfish	4	1,082.00	1,758.50	1.63
Unicornfish	2	858.00	1,252.95	1.46
Dolphin (mahimahi)	6	237.00	323.90	1.37
Marlin	1	115.00	201.25	1.75
Rainbow runner	4	855.00	1,195.75	1.40
Wahoo	14	1,186.00	1,696.95	1.43
Skipjack tuna	69	12,900.00	16,081.05	1.25
Dogtooth tuna	1	87.00	104.40	1.20
Yellowfin tuna	20	1,583.00	2,115.20	1.34
Lobster	1	4.00	12.00	3.00
** SUBTOTAL **	217	30,280.00	42,802.20	

Table III.1.13

CNMI December 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	13	984.00	1,860.10	1.89
Onaga (red snapper)	1	35.00	210.00	6.00
Opakapaka (pink snp)	1	48.00	120.00	2.50
Reef fish	53	8,732.00	13,398.70	1.53
Rabbitfish (hitting)	40	1,121.00	2,071.60	1.85
Emperor (mafute)	2	120.00	275.00	2.29
Parrotfish	21	1,948.00	3,044.05	1.56
Surgeonfish	2	238.00	380.80	1.60
Goatfish	1	38.00	76.00	2.00
Dolphin (mahimahi)	5	518.00	676.00	1.31
Marlin	2	201.00	236.75	1.18
Wahoo	4	146.00	184.25	1.26
Skipjack tuna	58	9,498.00	11,806.40	1.24
Yellowfin tuna	6	494.00	742.25	1.50
** SUBTOTAL **	209	24,121.00	35,081.90	
** TOTAL **	3,081	442,326.88	621,962.98	

Figure III.1.1



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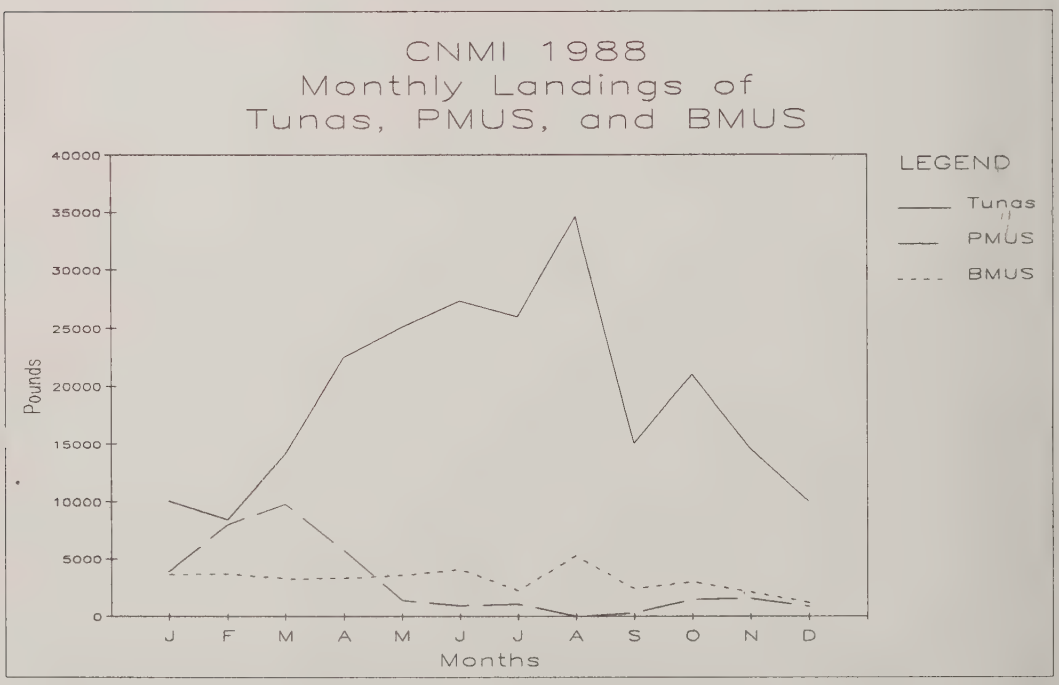

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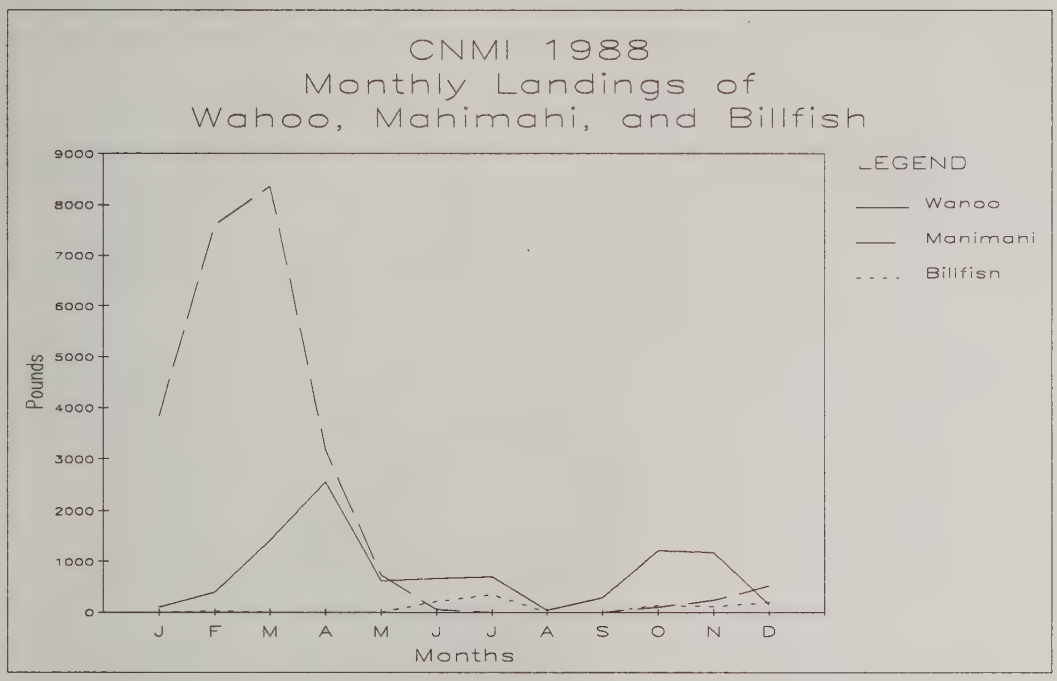

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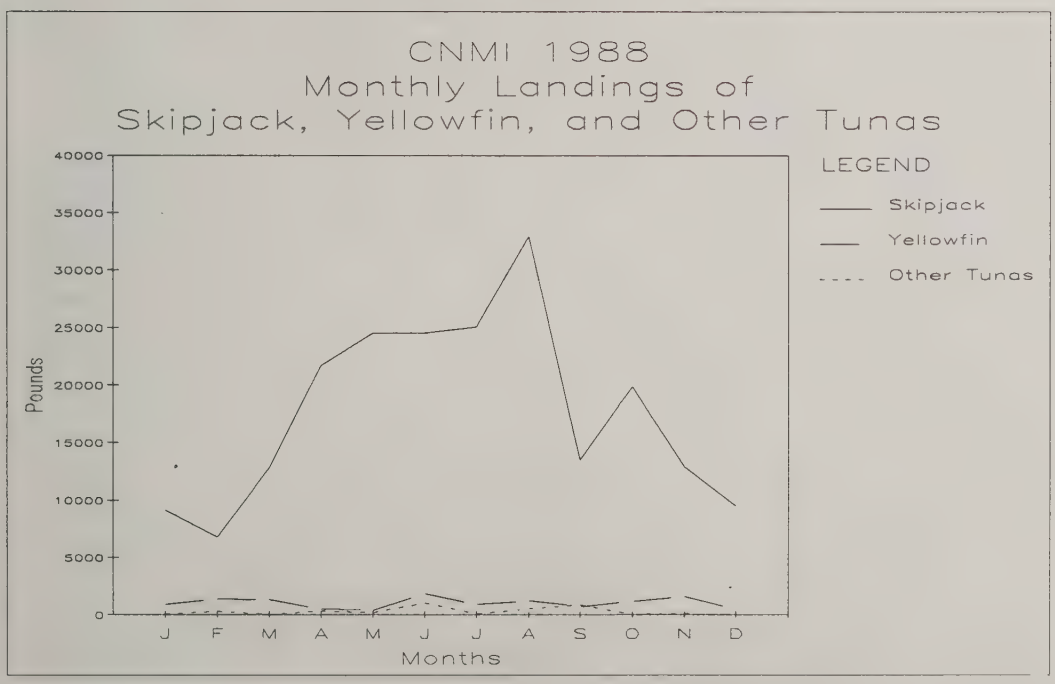

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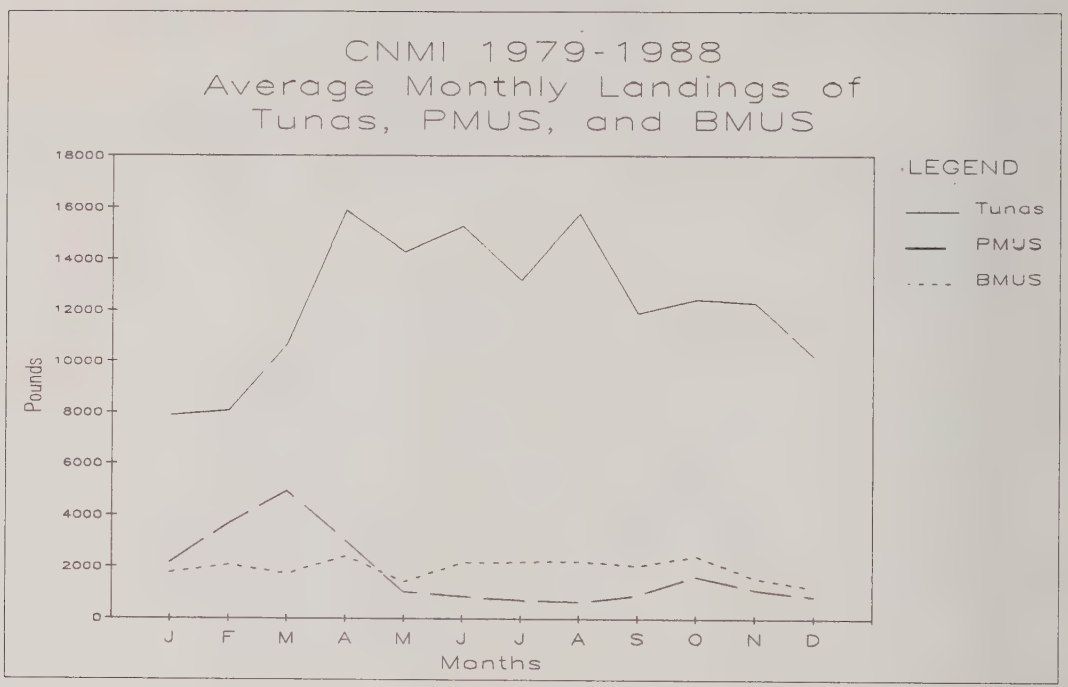

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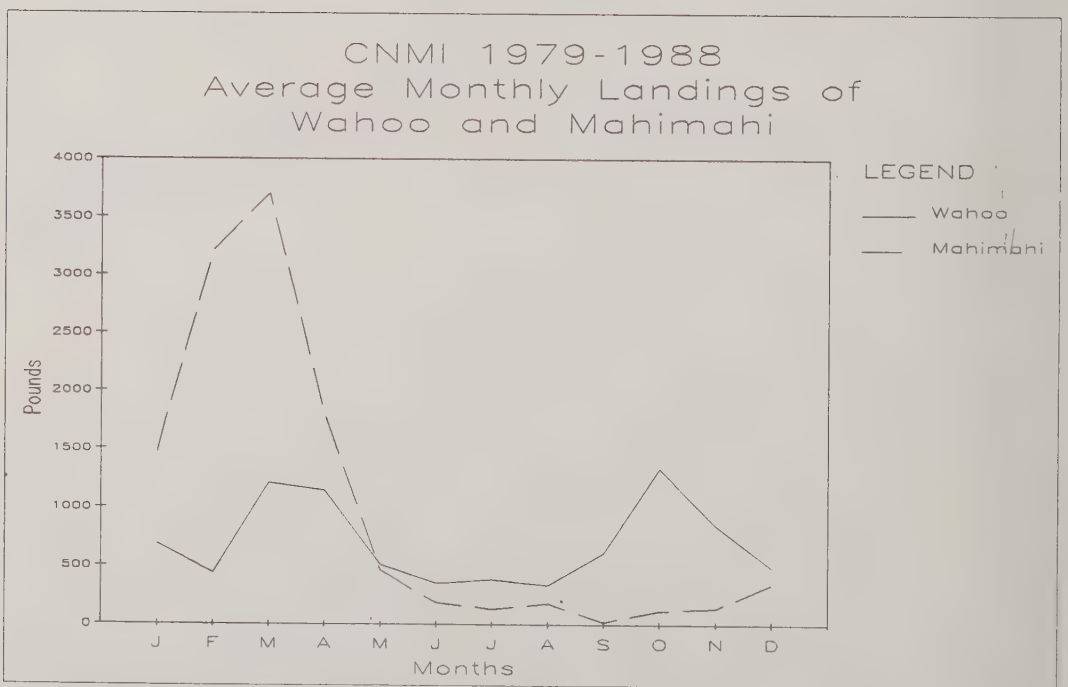

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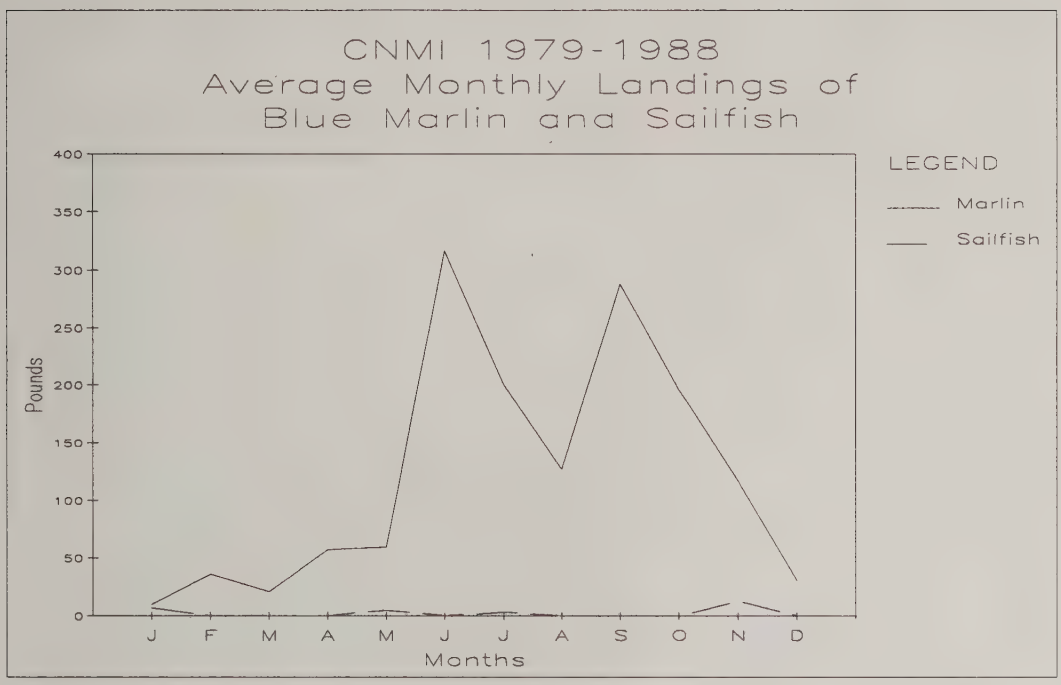

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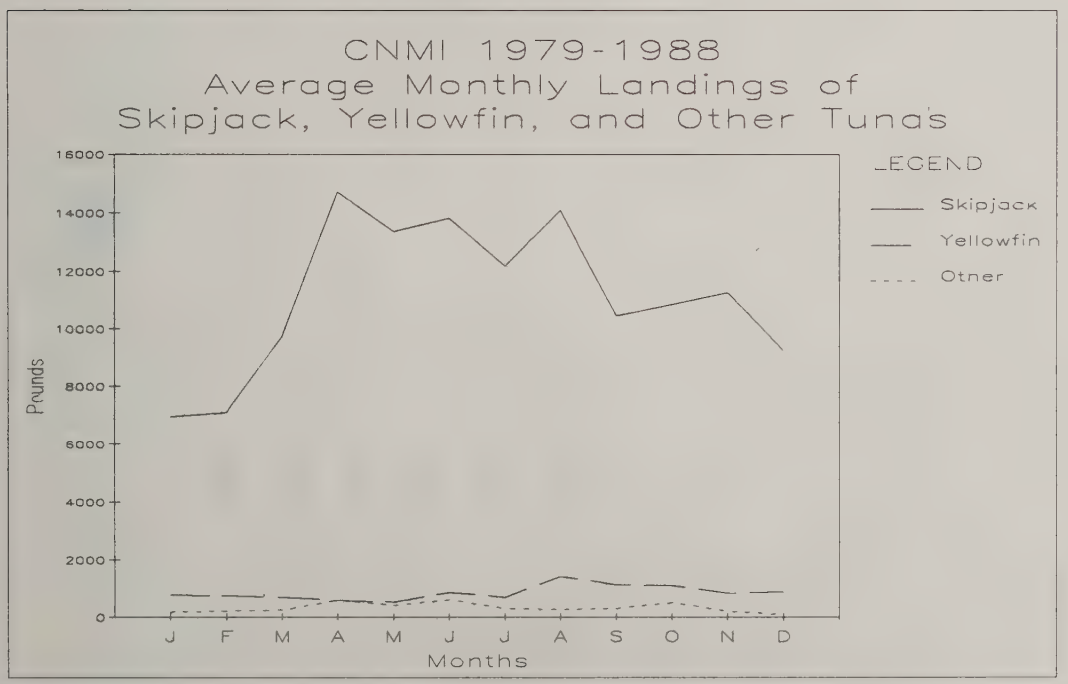

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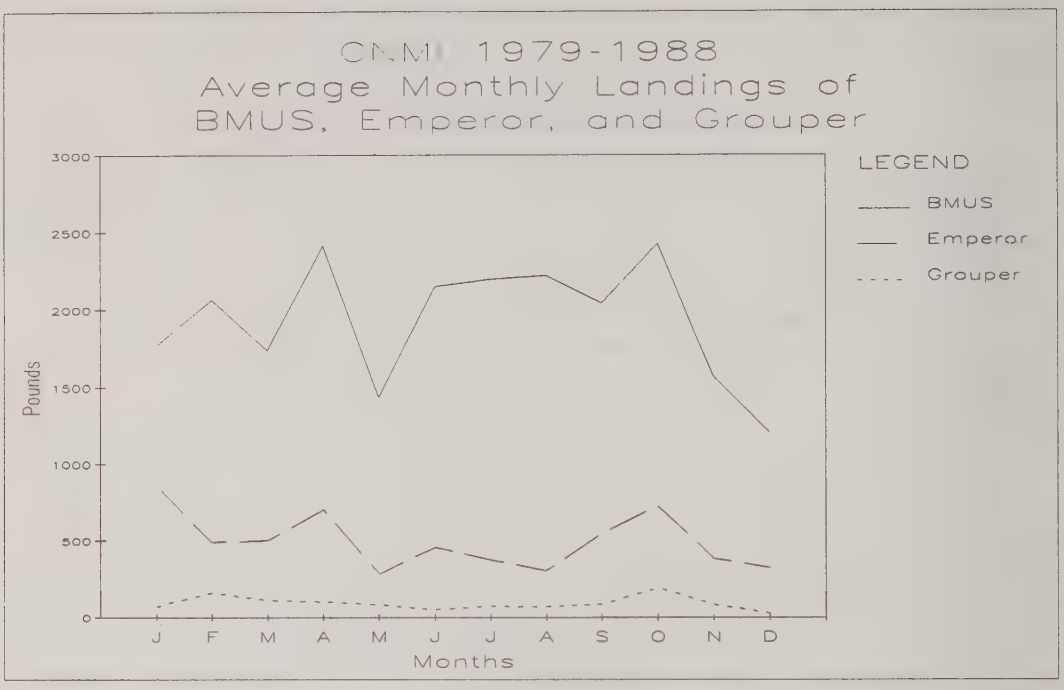

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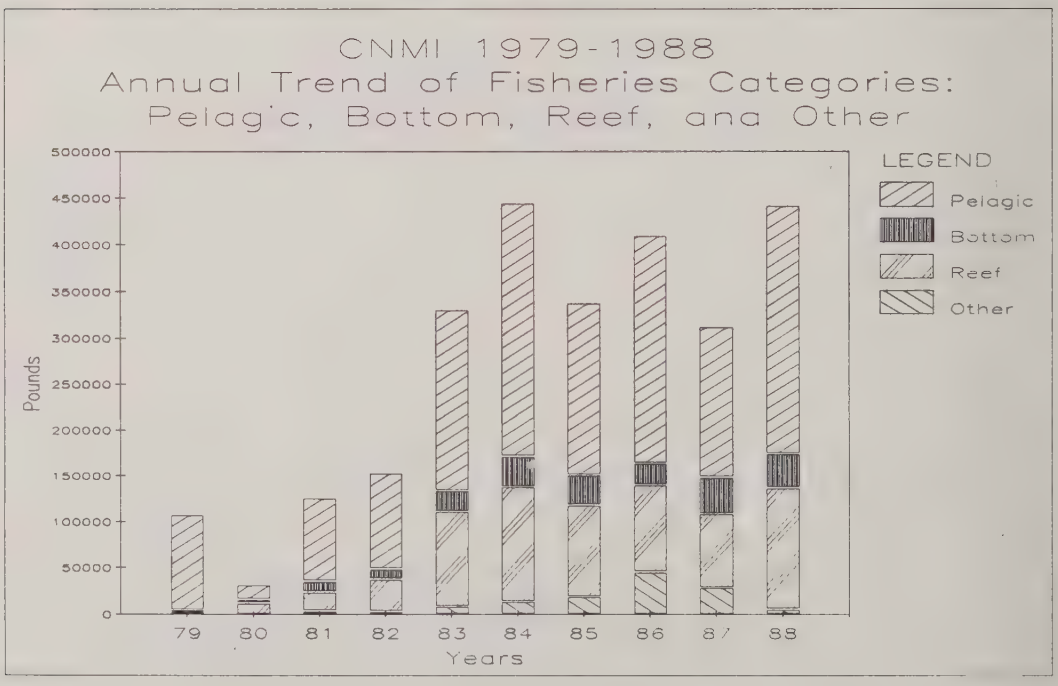

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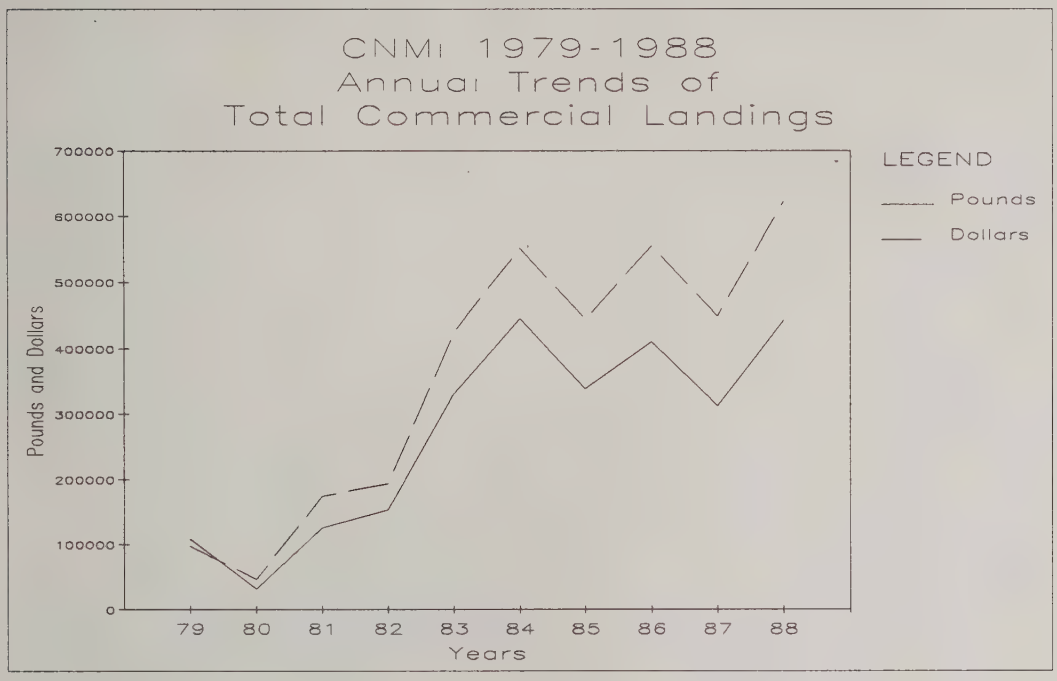

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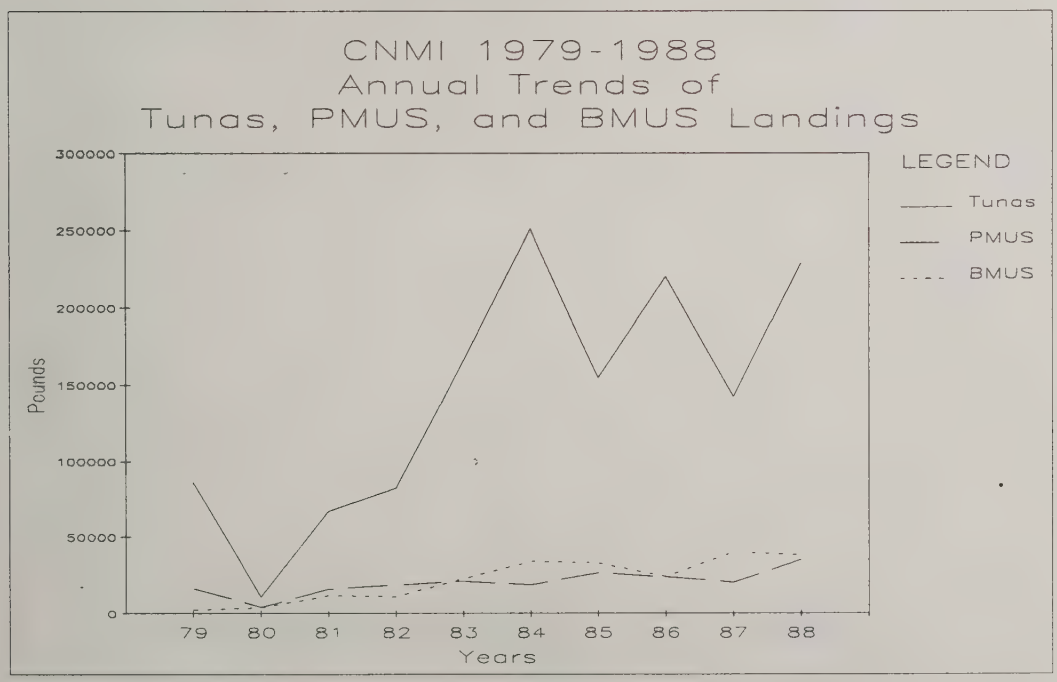

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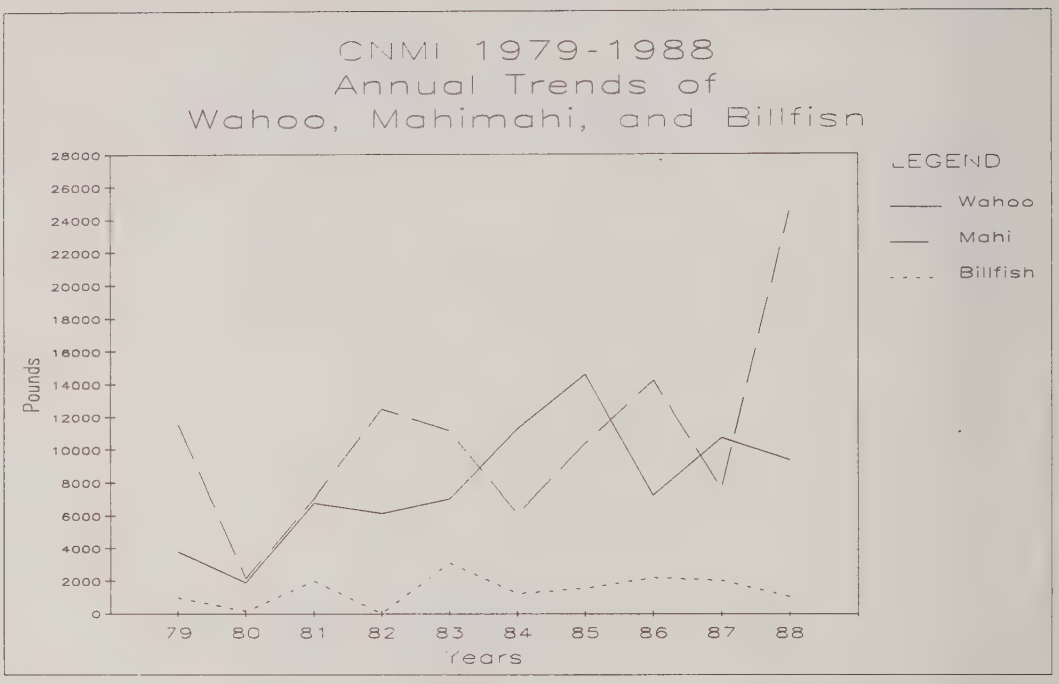

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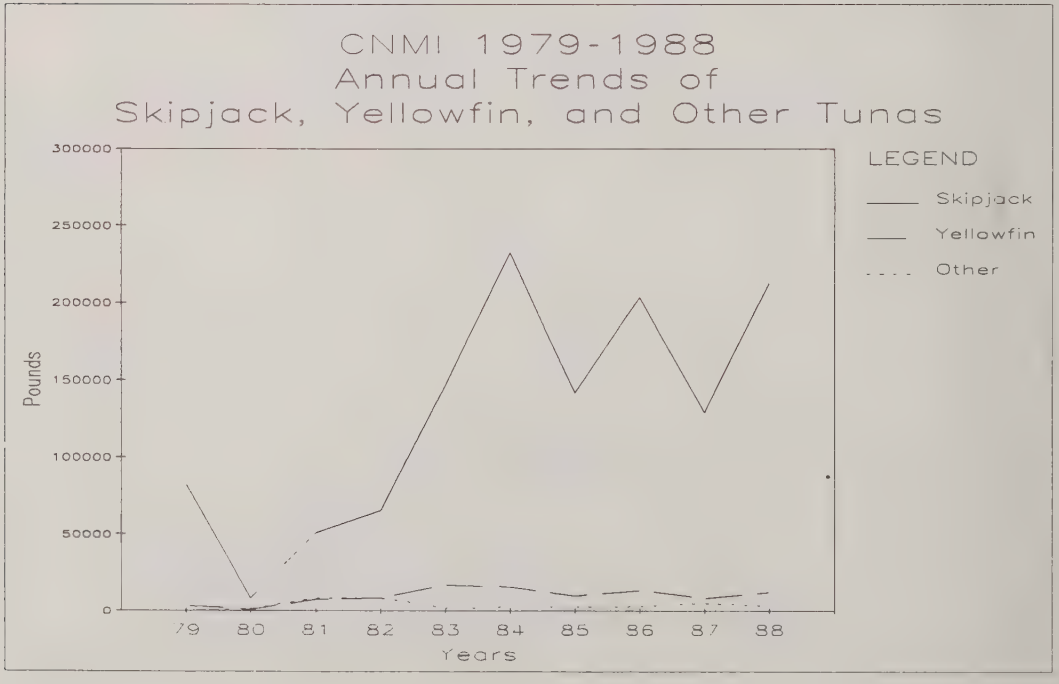

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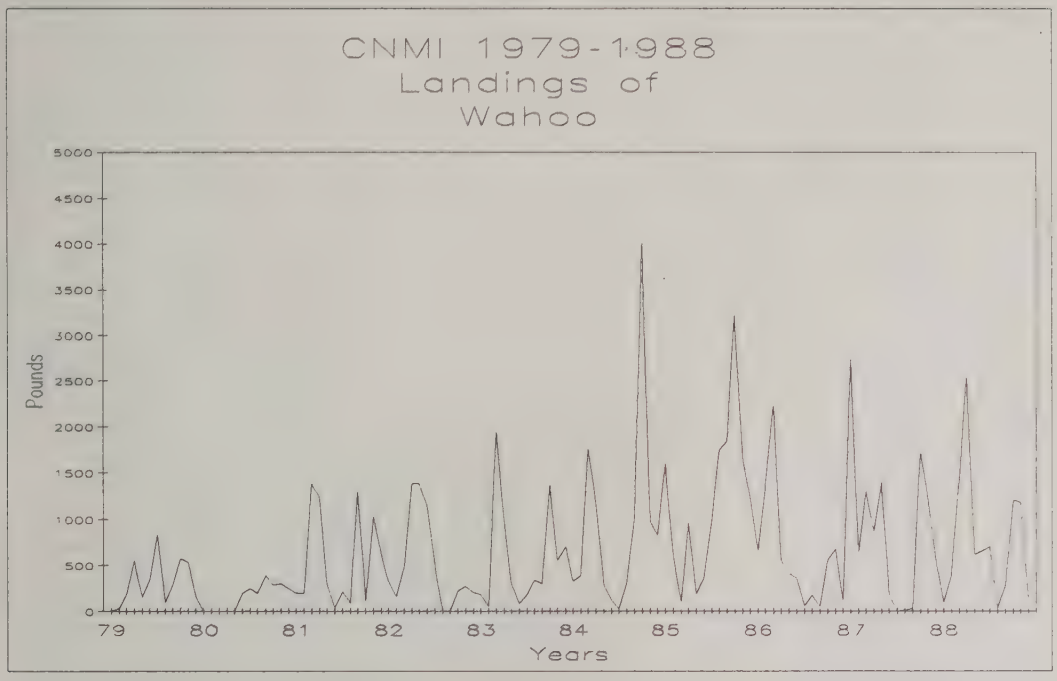

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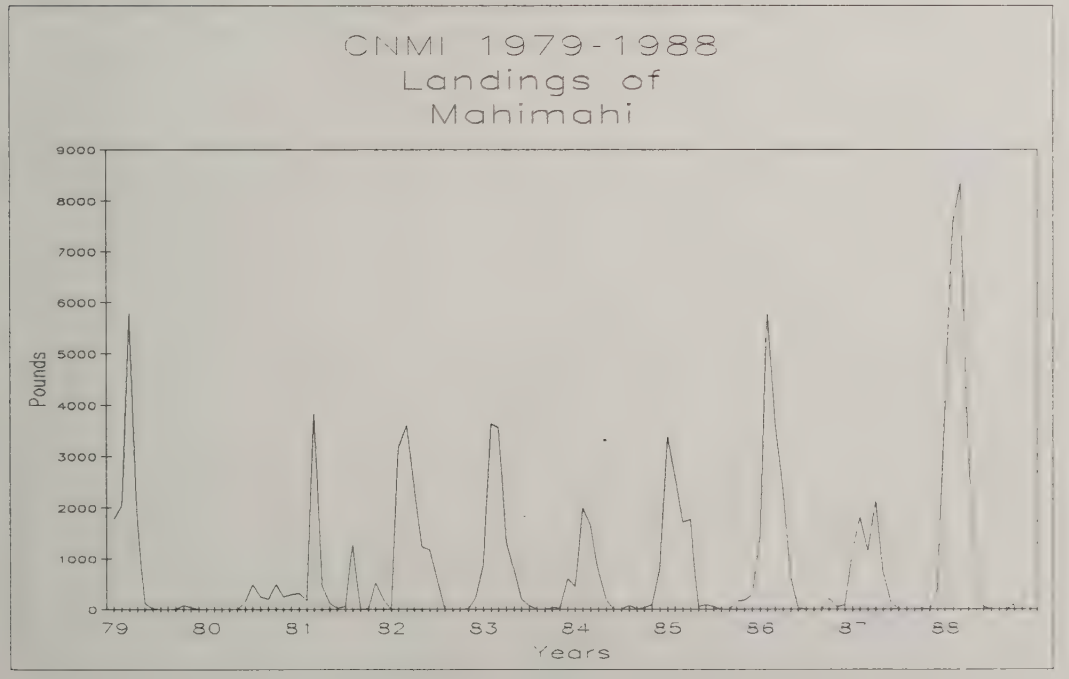

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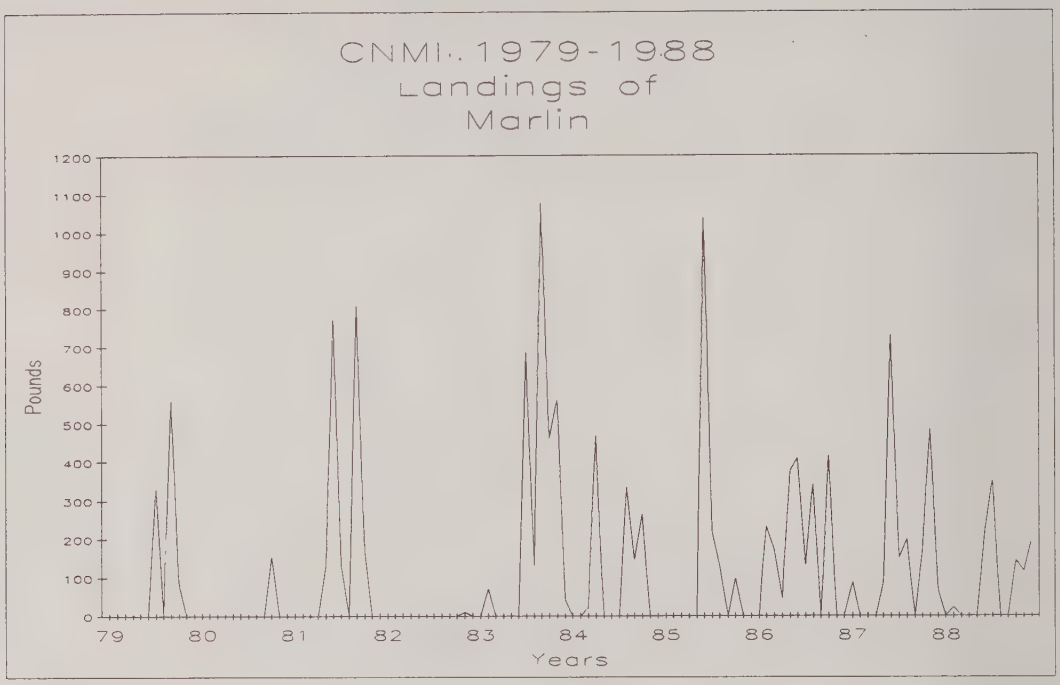

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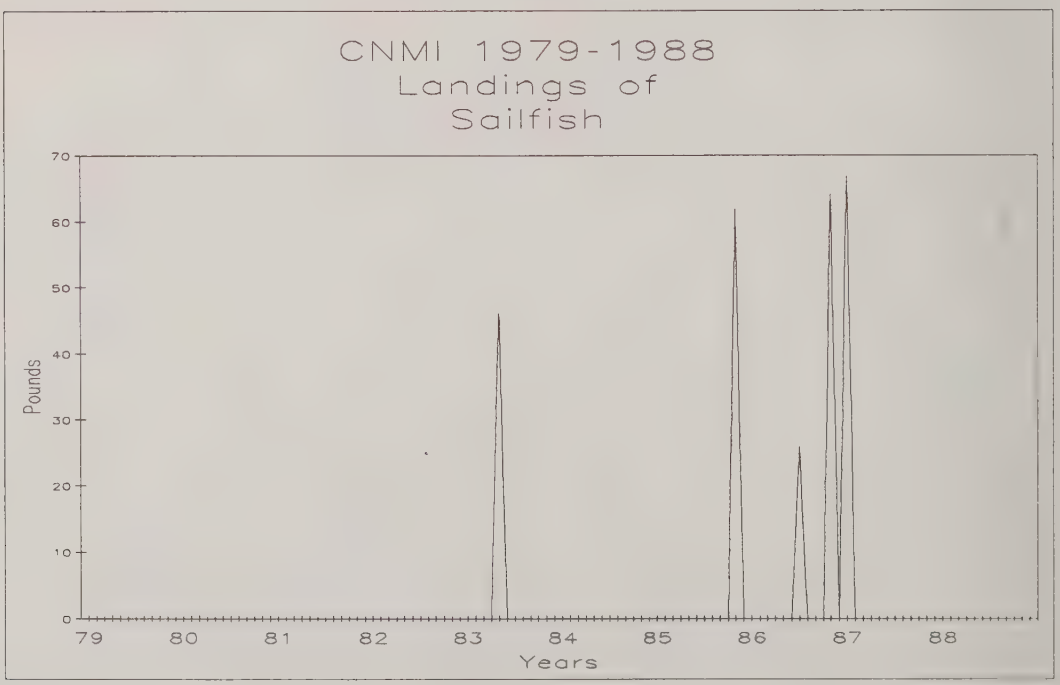

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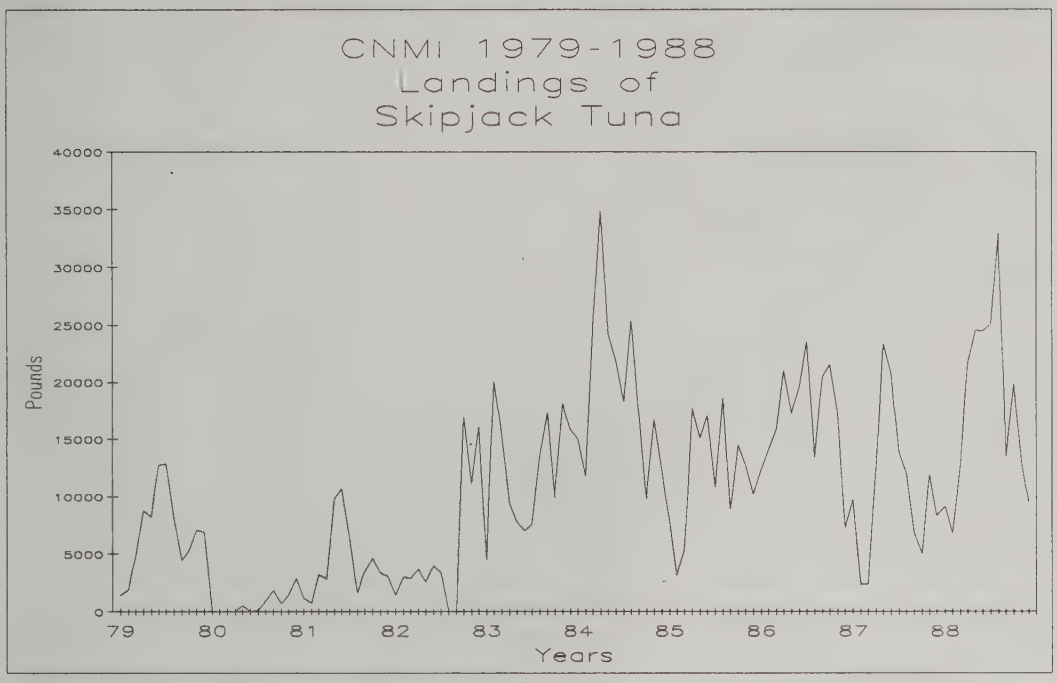

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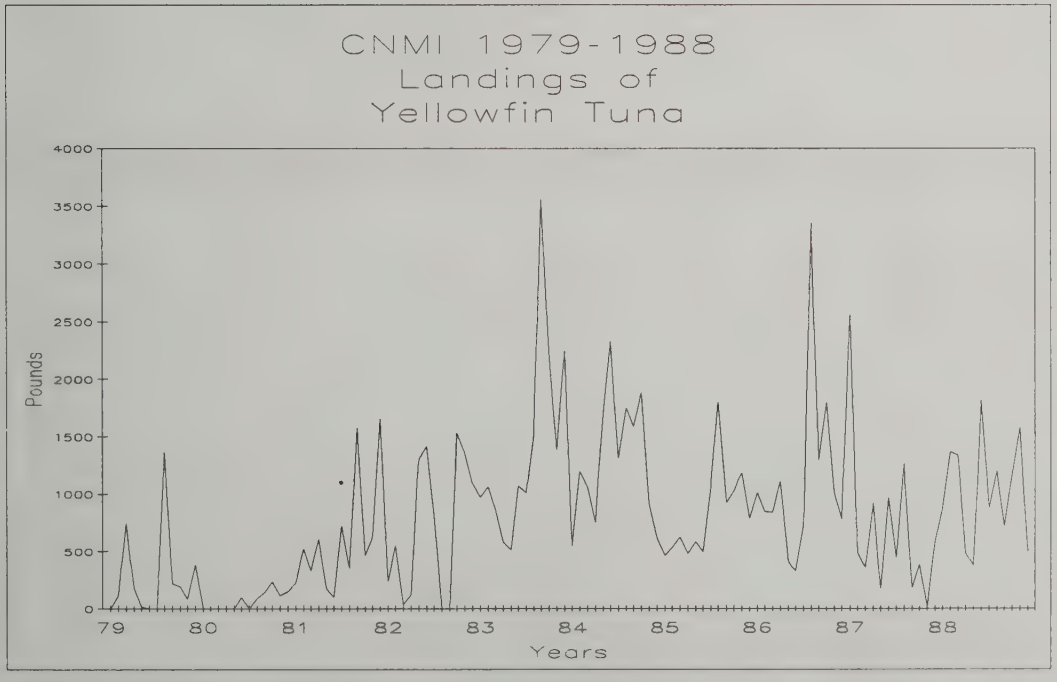

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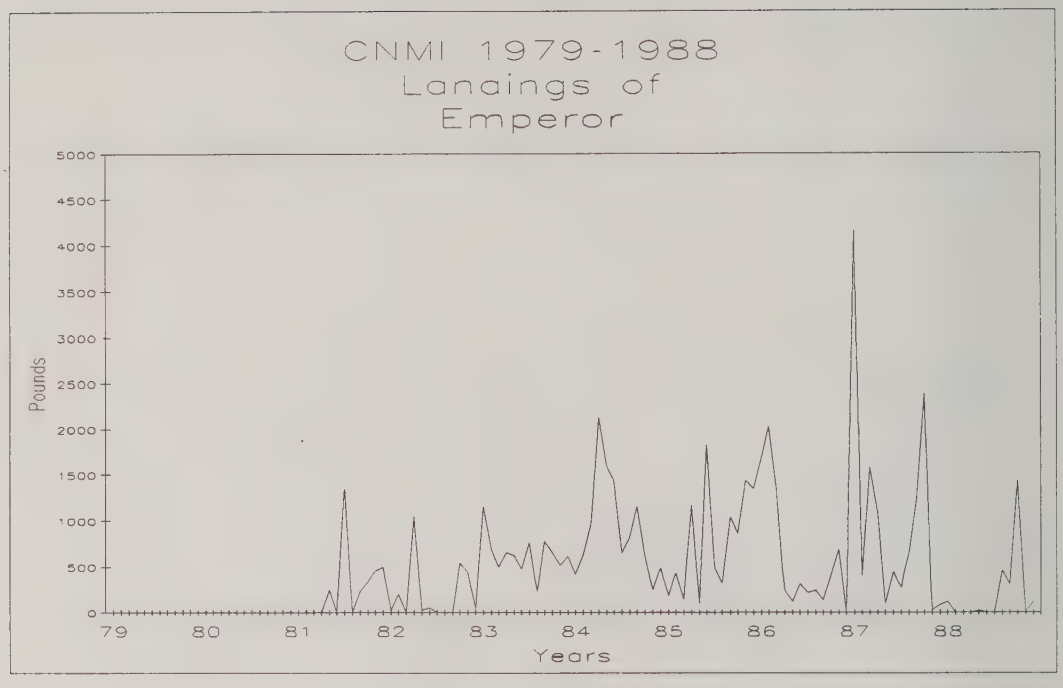

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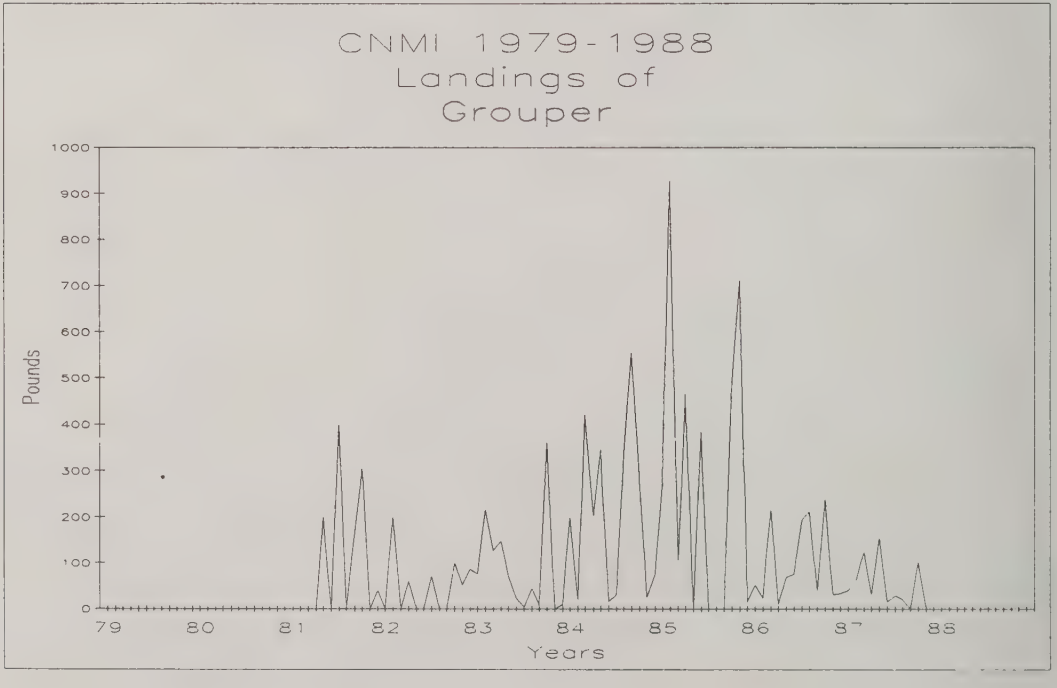

Territory of Guam

Fishery Statistics 1988

GUAM 1988 FISHERY STATISTICS

Compiled by

Guam Division of Aquatic and Wildlife Resources

and the

Western Pacific Fishery Information Network

May 1990

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GUAM 1988 FISHERY STATISTICS

INTRODUCTION

The Territory of Guam (lat. 13.4° N and long. 144.4° E) is the southernmost, largest, and most populous island in the Mariana Archipelago. All of the islands in the chain north of Guam belong to the Commonwealth of the Northern Mariana Islands. Guam is located about 6,000 km (3,700 mi) west-southwest of Honolulu, 2,500 km (1,550 mi) south-southeast of Tokyo, and 2,600 km (1,600 mi) east of Manila. Guam is about 48 km (30 mi) long, varies from 6 to 14 km (4 to 9 mi) wide, and has an estimated land area of 554 km^2 (214 mi^2) and a population of about 120,000.

Fishing activities on Guam can be divided into two basic categories: offshore and inshore fishing. Offshore fishing typically involves small boat (12 to 48 feet), 1 to 2-day trolling and bottom fishing trips that usually originate from one of the three principal harbors located on the west coast and southern tip of the island. Inshore fishing is typically conducted without the use of a boat and consists mostly of nearshore casting, netting, and spearfishing. The Guam Department of Agriculture's Division of Aquatic and Wildlife Resources (DAWR) has been conducting offshore and inshore creel surveys since the early 1970's. Beginning in 1982, DAWR began modifying its data collecting and processing systems to improve estimates of catch and effort by improving sampling techniques and by incorporating the use of microcomputers to expand the survey data. The WPACFIN provided microcomputers and training and worked with DAWR staff and a contractor to redesign the sampling program. In 1982, WPACFIN also began working with local fish wholesalers to obtain information on the commercial landings of Guam. It is from these two sources, DAWR and wholesalers, that the original data for the statistics presented in this report have come.

DATA COLLECTING SYSTEMS

The Guam data collecting systems are divided into two distinctly different systems, one for collecting commercial landings information and one for collecting total landings information through creel surveys.

Commercial Landings

Fish entering the commercial market in Guam come from three sources, full-time commercial fishermen, part-time commercial fishermen, and subsistence or recreational fishermen who frequently sell portions of their catch. No licenses are required to sell fish in Guam, nor are there any reporting requirements for

those selling fish. Before 1979, there was no central place to sell fish, so fishermen had to develop their own markets and peddle their own fish after each trip. The Guam Fishermen's Coop was established, via some government funding, in Agana in July 1979. The Coop subsequently became the central distribution center for fresh local fish. In 1982, WPACFIN began working with the Coop to improve their invoicing system and obtain data on all fish purchases. A cooperative system was established whereby the Coop would use the forms and coding schemes designed by WPACFIN and would supply copies of all invoices to WPACFIN for entering into computer format. In return, WPACFIN would provide the Coop with document quality control and computer generated summary statistics. All purchase data back to July 1979 also were coded and computerized.

Data from two other fish wholesalers were collected beginning in 1983 and continued until early 1987 by which time both had left the business. During 1987, a foreign tuna longline fleet began transshipping fish out of Guam. Excess fish from these boats became available to local buyers and the Coop's business suffered. Because of these and other marketing problems in 1987 and 1988 the recorded commercial purchases made by the Coop declined. Therefore our percent coverage of the total commercial landings declined, and the reported commercial data for 1988 do not reflect the true commercial fisheries as well as previous years. All tables and figures of commercial landings information included in this report are provided with the consent of the Coop wholesalers.

Data collected on commercial forms include

- Date
- Fisherman code
- Number of fishermen
- Hours fished
- Area fished
- Species caught
- Number of pieces caught
- Pounds caught
- Price per pound

Creel Surveys

The DAWR has the responsibility to monitor and protect the wildlife and marine resources of Guam. To this end, it began conducting creel surveys in the early 1970's. By systematic, random interviewing of fishermen, DAWR developed a means of estimating total catch and effort by fishing method for the inshore and offshore fisheries. Sampling methodologies were frequently modified in the early years to incorporate new information and insights gained during the surveys. Aerial surveys were conducted for several years to help improve estimates of percent coverage. The basic survey methodology was fairly well established by 1979. All data processing was done by hand.

In the 1970's, an annual fishing derby was organized on Guam by groups of local fishermen. This 3-day tournament soon became a highly successful event, with much participation by local recreational and commercial fishermen. The DAWR began collecting census information on the Annual Mariana's Fishing Derby activities as a means of obtaining additional catch and effort information. Although the significance of these data is minor compared to the creel surveys, summaries of derby results are included in this document as a point of interest.

In 1982, WPACFIN hired a contractor to work with DAWR staff to improve the statistical validity of the creel surveys and to establish mathematical algorithms to expand the sample data to estimate total catch and effort with confidence intervals. Consequently, DAWR further improved its sampling methodologies based on the contractor's recommendations, such as adding surveys to better estimate total participation. The WPACFIN developed computer processing systems to automate the data handling and expansion activities. The system design is flexible enough to allow for continued improvements as additional information, insight, and funding are gained. It is essential for the user to understand the basic sampling design and some of the assumptions made for the offshore and inshore surveys to facilitate proper interpretation of the resultant statistics.

The DAWR's fishermen interviews, also called creel surveys, are divided into two separate, major surveys, offshore and inshore. Both are based on a systematic, random sampling of the fisheries; field sampling and interviews are done on a specific number of randomly selected weekdays and weekend-holidays each month. Both surveys are stratified by weekday and weekend- holiday sampling and, during 1988, were conducted on 4 days per month. Both include two subsurveys, one for counting and estimating total participation and one for actually interviewing fishermen for catch and effort information. Both are based on the assumptions that the information given by the fishermen is accurate and the fishermen interviewed are representative of the entire fishing population.

Offshore Creel

Most offshore fishing trips originate from one of three harbors on Guam. Apra Harbor is the largest of these harbors, serves military and commercial shipping activities, and is considered one of the best natural harbors in the western Pacific. It ranks third among the harbors as points of origination for offshore fishing trips. Cocos Lagoon on Guam's southern tip is the second largest protected harbor and ranks second as a launching area for offshore fishing trips. The Agana Boat Basin, centrally located on the west coast of Guam in the capitol of Agana, is the smallest of the three harbors but is the busiest launching area for offshore fishing trips. Therefore, DAWR selected the boat basin as the site for interviewing offshore fishermen.

Concurrent with interviewing fishermen returning from trips at the boat basin, a participation survey is conducted to obtain counts of boating activity for the entire island. For estimating total participation for a survey day, unless contrary information is available, a boat is assumed to be fishing if it is "out," as evidenced by its trailer at a boat ramp or being missing from its normal berthing area. A further assumption is made that the fishing activity and success rate of fishermen originating at the Agana Boat Basin are not statistically different from those of fishermen leaving from other areas on the island. The basic premise of the offshore sampling program is that the combined interviews collected on each survey day are sufficient to estimate the average catch and effort for each fishing method used during that day. Therefore, each survey day represents a measurement of the offshore fisheries. Data collected during the participation portion of the offshore creel survey are limited to boat count by launching area, whereas data collected during interviews include the following:

* Date (year, month, day)
* Type day (weekday or weekend-holiday)
* Fishing method
* Interview time
  Area fished
  Boat number
* Number of fishermen
* Number of gear units
* Hours fished per gear
  Total count for all species combined
  Type total count
* Total weight for all species combined
  Type total weight
  Total number of species
  Type total number of species
Total count for each species
  Type count for each species
Total weight for each species
  Type total weight for each species
Species name (or species group)
  Length for an individual fish
  Type individual length
  Weight for an individual fish
  Type individual weight
  Bait used (up to three different types)
  Wind direction and speed
  Weather conditions
  Cloud cover
  Lunar day
  Percent of catch kept
  Percent of catch sold to the Coop
  Percent of catch sold elsewhere

It is not always possible for the interviewer to obtain information on all items listed. However, those marked with an asterisk (*)

are essential to the data expansion process for estimating total catch and effort. Those marked with a pound or number sign (#) are essential to estimating the percent species composition of the catch. The "type" elements (e.g., type individual length) identify the kind of measurements, i.e., either actual, estimated, or calculated.

Inshore Creel Survey

Fielding the inshore creel survey is considerably more complex and troublesome than the offshore survey for several reasons. For instance, fishing activities originate from and occur over a large portion of the coastline, making participation counts and fishermen interviews much more difficult to obtain. Additionally, it is more difficult to obtain interviews for completed fishing trips because the interviewer must survey many miles of coastline where fishermen may quickly terminate their activities at any time. The turnover rate of fishermen during the sampling period is a difficult factor for which to adjust. Tidal stage and moon phase also influence inshore fishing much more than offshore fishing. Nighttime and seasonal pulse fishing are also major considerations for the inshore fisheries. In October 1984, DAWR began additional survey efforts to help quantify the nighttime and seasonal inshore fisheries.

Notwithstanding these complexities and problems, the basic designs of the offshore and inshore surveys are very similar in that they both have participation counts and creel interviews. Two of the significant differences between the offshore and inshore surveys are that the inshore participation counts are made by fishing method as well as by location, and that interview information is combined to form averages of catch and effort for a much larger time period (month, quarter, year) than a single day as in the offshore survey. Therefore, daily measurements of the inshore fisheries are based on island-wide participation counts for a survey day by using averages for the catch information based on user-specified, flexible time periods, typically quarterly and annual averages. This modification of the expansion algorithm was required for DAWR to physically complete an inshore survey with limited manpower. Participation counts for essentially the entire island can be obtained during a single sample day, but adequate creel interviews for all methods for the entire island cannot be obtained with the manpower available. Additionally, the surveyable portions of the coastline are divided into three regions to facilitate statistically sound sampling of fishermen. Data for the day and night surveys are processed and expanded separately. Data on the seasonal fisheries for juvenile rabbitfish and bigeye scad are collected at irregular intervals when the fisheries are active. Information collected during the inshore participation surveys includes

* Date (year, month, day)
* Type day (weekday or weekend-holiday)

* Location fished
  Time sighted
* Method used
* Number of persons
* Number of gear units
  Reef zone fished
  Weather and water conditions
  Tidal stage

Information collected during the inshore interviews includes

* Date (year, month, day)
* Type day (weekday or weekend-holiday)
* Fishing method
* Interview time
* Location
  Reef zone fished
* Number of fishermen
* Number of gear units
* Actual hours fished per gear
* Estimated trip time
  Total count for all species combined
  Type total count
* Total weight for all species combined
  Type total weight
  Total number of species
Total count for each species
  Type count for each species
Total weight for each species
  Type total weight for each species
Species name (or species group)
  Length for an individual fish
  Type individual length
  Weight for an individual fish
  Type individual weight
  Bait
  Wind direction
  Wind speed
  Weather conditions
  Cloud cover
  Surf
  Tidal stage
  Swell direction

As in the offshore survey, the interviewer cannot always obtain information on all items listed. Those marked with an asterisk are essential to the data expansion process for estimating total catch and effort. Those marked with a pound or number sign are essential to estimating the percent species composition of the catch. The "type" elements (e.g., type individual length) identify the kind of measurements, i.e., either actual, estimated, or calculated.

DATA PROCESSING SYSTEMS

The Guam data processing systems are divided into two separate and distinctly different systems, one for processing the commercial landings data and one for processing the DAWR creel survey data.

Commercial Landings

The processing system for the commercial landings data collected from the wholesalers is fairly straightforward. A purchase form is completed by the wholesaler each time fish are purchased from a fisherman. Catches are divided into categories for weighing by species or species group, and where practicable, number of pieces is recorded. Preferably, coding and initial quality control of the forms are done by Coop or DAWR personnel before they are shipped to WPACFIN for computer processing; however, these activities must sometimes be done by WPACFIN staff. Data are entered into a computer and loaded into central WPACFIN data bases, where edit reports are generated and used to locate and correct any errors in the data base. Once all edits, verifications, and corrections are made, summary reports are generated. Standard reports available include total monthly and annual landings by species, total landings by fisherman, and landings by fisherman by species. Purchase forms are returned to the wholesalers along with summary reports and graphs for their use.

Creel Surveys

The processing systems for the creel surveys are much more complex than those for the commercial landings data. The basic data handling and processing systems for the inshore and offshore surveys are the same. Data forms completed in the field during the participation and creel surveys are returned to the office and edited for completeness and legibility before the data are entered into structured computer data bases by using commercially available data base management software. Edit and summary reports are produced to verify the quality of the data, and any errors are corrected in the data bases. Data bases are then translated into standard record formats, which are readable by the data processing and expansion systems programmed by WPACFIN specifically for the offshore and inshore surveys. As data are converted into the Guam Offshore Expansion System (GOES) and the Guam Inshore Expansion System (GIES), additional error checks are performed by the computer to ensure only valid information enters the expansion systems. Errors are flagged and printed to facilitate correction. The GOES and GIES are menu- driven systems that step the user through a series of processes that summarize creel survey and participation data to produce catch and effort expansion and species composition files and reports. Although the GOES and GIES allow processing data for whatever time increment the user specifies, typically 1 month of data is processed at a time for the

offshore surveys, and 3-month or annual data are combined for the inshore surveys.

Generally speaking, the expansion algorithms for the offshore and inshore surveys are very similar. Estimates of total catch, effort, and participation for each fishing method are generated from information collected during the participation and creel surveys. The GOES uses same-day catch and effort averages to expand the participation counts, whereas the GIES uses user-specified, time period catch and effort averages to expand the daily participation counts. Inshore day and night surveys are treated identically but separately. The daily estimates are considered measurements of the fisheries for that day. Average weekday and weekend-holiday estimates and their associated variances or confidence intervals are created from individual daily measurements. These are weighted by the number of each type of day in the month, or other timespan, and multiplied by proportionality constants to adjust for percent coverage to produce estimates of total catch, effort, and participation along with their confidence intervals. All steps in the expansion process are stratified by fishing method. The expansion systems produce several detailed summary reports and a summary expansion data file containing the final totals for all important catch and effort statistics. This summary expansion file is later used to produce the types of reports contained in this document.

Estimates of species composition of the expanded catch are obtained for each method by multiplying the calculated percent species composition of the surveyed catch by the expanded total catch. Percent species composition by fishing method is obtained from the sampled catch based on the average individual weight and the total number of individuals recorded for that species. The average size of each species is obtained by one of three methods, depending on the availability of data in the data base. If total weight and count information are available, the average size per individual is calculated by dividing the total weight by the total count. If total weight and count information are not available but individual weight measurements for a species are available, the average size per individual is calculated by dividing the sum of all individual weights by the total number of individuals weighed. If neither of these methods can be used because no size information is available in the data base, the user is asked to input the species' average size, which is then multiplied by its total count to estimate total sampled catch of that species. Therefore, percent species composition is calculated by dividing the estimated sampled weight of the species by the estimated total sampled weight of all species combined. The species composition programs produce summary reports for immediate reference and summary data files for later use by reporting and summarizing software for generating the types of reports contained in this document.

Catch, effort, and participation data collected during the seasonal fisheries for bigeye scad and juvenile rabbitfish are processed by hand. Interview records are scarce, so hand

tabulations and expansions are made to produce ballpark estimates of catch.

DATA REPORTING SYSTEMS

The Guam data reporting systems are divided into two separate systems, one for reporting on the commercial landings data and one for reporting the results of the creel survey.

Commercial Landings

After completing all editing and quality control activities for the commercial landings data, monthly and annual summary reports by species are generated. The commercial landings reports section of this document includes monthly and annual reports for 1988. Each table contains information on the pounds, value, average price per pound, and number of recorded landings for each species or species group. The number of recorded landings ("RECORDS" in the tables) is a measurement of how many times each species was purchased, regardless of its number or weight in the landing. This statistic is provided to give an indication of the frequency each species is reported. The POUNDS can be divided by the RECORDS to calculate the average weight of each landing. Each monthly report contains a subtotal for the sum of all species combined for that month, and the December report also includes the annual total. Annual reports contain the total landings for each species and the total recorded landings for all species for the calendar year.

Included with the commercial landings summary reports are graphs of some of the important statistics. The following groupings of species, species categories, and abbreviations are used in the tables and graphs for Guam's commercial landings:

I. Pelagic Management Unit Species (PMUS)

Mahimahi (dolphinfish)
Marlin (probably all blue but possibly striped or black)
Shortbill spearfish
Sailfish
Wahoo
Sharks

II. Bottom Fish Management Unit Species (BMUS)

Jacks (unclassified but excluding bigeye scad)
Bottom fish (unclassified)
Ehu (red snapper)
Gindai (flower snapper)
Grouper
Kalekale (pink snapper)
Lehi (silverjaw snapper)

Onaga (red or longtail snapper)
Opakapaka (pink snapper)
Uku (gray snapper)
Emperorfish

III. Billfish

Marlin (probably all blue but possibly striped or black)
Shortbill spearfish
Sailfish

IV. Tunas

Tunas (unclassified)
Skipjack tuna
Yellowfin tuna
Dogtooth or white tuna
Kawakawa

V. Other Tuna

All the above tunas excluding skipjack and yellowfin tunas.

VI. Fisheries Categories

A. Pelagic Species

All PMUS and tuna species plus the following:
Troll fish (unclassified)
Barracuda
Rainbow runner

B. Bottom Fish

Same as the BMUS

C. Reef Fish

Reef fish (unclassified)
Giant wrasse
Rabbitfish
Rudderfish
Squirrelfish
Parrotfish
Snapper
Surgeonfish
Unicornfish
Goatfish

D. Other

Miscellaneous (unclassified)
Bigeye scad
Mullet
Eels

Milkfish
Invertebrates (unclassified)
Crabs (unclassified)
Coconut crab
Lobster
Shrimp
Octopus
Squid
Seaweeds
Imported

Creel Surveys

Two general types of reports are included in this document from the DAWR creel surveys, catch and effort expansion reports and species composition reports. These reports are produced by using the expansion and species composition files created by the GOES and GIES as input to a series of utility programs developed by WPACFIN. The utility programs reorganize, format, and summarize data from the GOES and GIES files to improve the presentation of the data and reduce the amount of space required to report the important statistics. Two of the most significant space saving improvements are the combining of many species into species groups, usually to the family level, and the combining of lesser used fishing methods into a single category. The original offshore and inshore species composition files contained about 300 different species categories, which were reduced to about 90 categories. For instance, 22 species of squirrelfish and 20 species of wrasse were reduced to just the 2 family groupings. All significant or important species retain their individual identity and are reported separately in the tables. In the original offshore species composition files, catches were reported for nine fishing methods; however, only two methods, trolling and bottom fishing, were significant as they generally accounted for over 97% of the catch. Therefore, reports of offshore species composition were reduced to just three method categories, trolling, bottom fishing, and other. Inshore species composition reports were reduced to totals only. Expansion reports for the inshore and offshore surveys include estimates of total catch and effort for each method recorded.

Monthly and annual catch and effort expansion reports and species composition reports are presented for the offshore fisheries for 1988. Monthly expansion and species composition reports have matching totals for catch by fishing method since the monthly species composition reports are based on the expansion files. Annual expansion and species composition reports also have identical totals because the species reports were generated from the annual expansion files. However, the totals on the annual reports will not equal those obtained by adding all of the monthly files together because the annual expansion reports were generated by re-expanding the entire year's data together, thereby increasing the sample size significantly, and it is hoped, improving the annual estimates of percent species composition and of catch and

effort and their associated coefficients of variation (CV's). This also makes expansion possible for months in which sampling was insufficient or nonexistent. The annual species composition reports were created by calculating annual percentages of species composition by combining all sampling for the year and then multiplying these percentages by the annual expansion totals. This allows calculation of percent species composition based on greatly increased sample size. Annual expansion and species composition reports are presented for the day and night inshore creel surveys for 1988. Combined day-night and offshore-inshore species composition reports are also presented.

Computer generated numbers and all totals in the reports are subject to rounding error. All catches are reported in pounds, and effort, in hours (boat hours for the offshore survey and gear hours for the inshore surveys). In the offshore expansion reports, the boat counts by fishing method will not add to the total boat count when the same boat was used for more than one method on a single trip. In these cases, the boat is included in the count for each method used but included only once in the total boat count. A separate CV is included for each statistic reported in the offshore expansion reports, but because of the differences in the offshore and inshore expansion algorithms, only a single CV is included for all statistics reported in the inshore expansion reports. The CV provides a measurement of the relative variation associated with the estimate preceding it and is calculated by dividing the standard error of the estimate by the estimate and multiplying by 100 and rounding to express the answer as a whole percentage. The larger the CV, the larger the relative variation in the data used to generate the estimate and, therefore, the less precise the estimate. An asterisk following a line means the number of samples collected for that method during that month were insufficient to properly calculate the CV. There must be at least two weekday and two weekend-holiday samples for each method to properly compute a standard error and, therefore, properly compute the CV. If an asterisk is present and the CV is greater than zero, then samples on either the weekdays or the weekend- holidays were sufficient to compute a standard error for that type of day but not for the other type of day. In this case, the CV provided in the report is for the type of day in which sample information met the minimum requirements for calculating CV. If an asterisk is present and the CV equals zero, then neither day had sufficient number of samples to calculate CV. It follows then, anytime an asterisk is present for any of the methods, the totals for the month are questionable.

In the offshore expansion reports, average monthly catch per unit of effort (CPUE) is calculated by using the same type of algorithm as for the other expansion elements, and it has an associated CV. First, the average daily CPUE is calculated by dividing the total weight of the fish sampled for a day by the total number of hours fished to produce that catch. Next, the average weekday and weekend-holiday CPUE's are calculated by summing the average daily CPUE's for each type of day and then dividing by the number of survey days for each type of day. These

averages are multiplied by the number of weekdays and weekend-holidays, respectively, in that month, then the products are summed and divided by the total number of days in the month to produce the average monthly CPUE for each offshore fishing method. The average monthly offshore CPUE could also be calculated by dividing the estimated monthly catch by the estimated monthly boat hours, but this would provide no indication of the variability of the CPUE and also essentially weight the average CPUE by the level of participation. However, for the inshore fisheries, which have a much lower number of creel interviews, the average monthly CPUE by fishing method is calculated by combining catch and effort information over a large timespan and, therefore, does not have an associated CV. Thus, the CPUE's for inshore fishing methods are calculated by dividing the sum of the catch by the sum of the gear-hours for whatever time period is included in the expansion.

Offshore species composition reports provide estimated landings and percent species composition for each species or species group for the two major offshore fishing methods, trolling and bottom fishing; a total for all other methods combined; and an overall total for all methods. The combined offshore-inshore and inshore species composition reports provide the statistics only for all methods combined.

The reports for the 1988 Annual Mariana's Fishing Derby include derby and species totals by day for a variety of catch and effort statistics. Seven major pelagic species are targeted during the derby, including billfish (primarily blue marlin but also sailfish, spearfish, and black marlin), yellowfin tuna, skipjack tuna, mahimahi, wahoo, rainbow runner, and barracuda. Most effort is directed at marlin, wahoo, and yellowfin tuna because prizes for these categories are the best. This tournament continues to grow in popularity and is the biggest organized fishing event in Guam.

INTERPRETATION OF STATISTICS

The user is reminded again to pay heed to the precautions and assumptions identified earlier in this document, when making interpretations of or inferences from data reported in the tables and graphs. Remember also that neither the commercial landings summaries nor the creel summaries are based on a census of all the fishing activities, but on samples of those activities. Commercial landings reports are believed to include a high percentage of the actual commercial landings made on Guam. The creel survey expansion reports are based on surveys of the offshore and inshore fisheries conducted 4 times per month. One of the major factors in expanding the survey data into monthly and annual estimates is the use of proportionality constants to adjust for percent coverage of the surveys. The flexibility of the survey design allows for refinement of these constants as additional information is gained on Guam's fishing activities. If the constants are improved upon, the basic survey data can be re-expanded to create better overall

estimates. However, the variability and species composition would not be expected to change since these statistics are strictly based on the actual survey information collected from the fishermen.

The creel survey reports in this section do not include estimates of catches made during the seasonal fisheries for bigeye scad and juvenile rabbitfish. Therefore, the user must remember to adjust estimates of the total inshore and combined inshore-offshore fisheries. Based on a special sampling program designed to target these seasonal fisheries, but still an admittedly small sample size, DAWR's best estimates for 1988 are 64,000 and 60,000 pounds for juvenile rabbitfish and bigeye scad, respectively. The rabbitfish harvest was exceptionally high compared to previous years (16 times as much as 1987) and the bigeye scad harvest was 50% higher than 1987.

Table IV.1.1

Guam 1988 Annual Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	3	238.00	239.00	1.00
Bigeye scad (atulai)	18	1,305.50	2,611.00	2.00
Jacks	48	1,215.45	1,649.40	1.36
Sharks	1	19.00	23.75	1.25
Bottom fish	104	3,198.25	6,377.22	1.99
Ehu (red snapper)	7	82.50	185.62	2.25
Gindai (flower snap)	31	580.00	1,304.95	2.25
Grouper	5	773.50	726.00	0.94
Kalikali (pink snap)	7	60.50	122.12	2.02
Lehi (silverjaw)	3	97.00	218.25	2.25
Onaga (red snapper)	19	910.50	2,272.87	2.50
Opakapaka (pink snp)	17	462.50	1,040.63	2.25
Uku (gray snapper)	21	286.50	428.50	1.50
Reef fish	262	7,824.20	15,480.90	1.98
Rabbitfish (hitting)	2	17.00	25.50	1.50
Rabbitfish (menahac)	2	501.00	708.50	1.41
Emperor (mafute)	9	229.25	458.50	2.00
Parrotfish	1	4.00	8.00	2.00
Snapper	1	37.50	56.25	1.50
Goatfish	1	9.50	14.25	1.50
Barracuda	84	1,419.50	1,927.50	1.36
Dolphin (mahimahi)	834	47,160.50	66,741.38	1.42
Marlin	129	18,670.50	15,995.07	0.86
Sailfish	15	1,317.00	1,331.62	1.01
Rainbow runner	101	1,982.50	2,865.42	1.45
Wahoo	679	25,079.50	44,095.20	1.76
Skipjack tuna	730	21,953.59	20,301.77	0.92
Dogtooth tuna	70	2,002.25	2,763.51	1.38
Yellowfin tuna	505	22,027.50	37,188.88	1.69
Lobster	9	206.00	595.00	2.89
Octopus	4	45.12	71.81	1.59
** TOTAL **	3,722	159,715.61	227,828.37	

Table IV.1.2

Guam January 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Jacks	2	118.00	131.75	1.12
Bottom fish	3	42.00	84.00	2.00
Reef fish	15	301.50	557.75	1.85
Barracuda	12	235.50	290.53	1.23
Dolphin (mahimahi)	115	5,303.25	10,396.50	1.96
Marlin	5	353.50	441.88	1.25
Sailfish	1	63.00	78.75	1.25
Rainbow runner	4	41.00	61.50	1.50
Wahoo	37	1,027.00	1,903.29	1.85
Skipjack tuna	37	693.50	709.88	1.02
Dogtooth tuna	4	76.00	95.01	1.25
Yellowfin tuna	38	1,465.50	2,667.95	1.82
** SUBTOTAL **	273	9,719.75	17,418.79	

Table IV.1.3

Guam February 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Jacks	1	35.00	43.75	1.25
Bottom fish	1	6.00	12.00	2.00
Reef fish	8	255.00	497.39	1.95
Barracuda	7	134.50	175.12	1.30
Dolphin (mahimahi)	192	9,850.75	14,290.01	1.45
Marlin	1	56.50	70.63	1.25
Sailfish	1	11.50	14.37	1.25
Rainbow runner	2	13.50	20.25	1.50
Wahoo	45	1,622.00	3,181.51	1.96
Skipjack tuna	47	1,073.25	1,073.25	1.00
Dogtooth tuna	7	114.00	145.38	1.28
Yellowfin tuna	29	914.50	1,647.87	1.80
** SUBTOTAL **	341	14,086.50	21,171.53	

Table IV.1.4

Guam March 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	3	127.00	245.75	1.94
Reef fish	18	532.75	1,041.20	1.95
Barracuda	5	88.00	132.00	1.50
Dolphin (mahimahi)	218	18,607.75	25,411.60	1.37
Sailfish	1	82.00	102.50	1.25
Wahoo	38	1,237.50	2,437.22	1.97
Skipjack tuna	74	1,886.25	1,886.25	1.00
Dogtooth tuna	4	121.00	181.50	1.50
Yellowfin tuna	37	1,528.50	2,910.36	1.90
Octopus	1	18.87	28.31	1.50
** SUBTOTAL **	399	24,229.62	34,376.69	

Table IV.1.5

Guam April 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Jacks	3	60.00	80.37	1.34
Bottom fish	11	457.00	1,001.85	2.19
Gindai (flower snap)	1	19.50	43.87	2.25
Uku (gray snapper)	5	85.50	128.25	1.50
Reef fish	35	858.75	1,850.76	2.16
Barracuda	3	52.00	58.00	1.12
Dolphin (mahimahi)	164	8,512.25	9,406.30	1.11
Marlin	6	868.50	1,085.62	1.25
Sailfish	3	187.00	221.25	1.18
Rainbow runner	1	3.50	5.25	1.50
Wahoo	82	3,199.50	5,662.55	1.77
Skipjack tuna	60	1,962.00	1,967.00	1.00
Dogtooth tuna	6	122.50	183.75	1.50
Yellowfin tuna	47	1,522.00	2,972.72	1.95
Octopus	1	18.00	27.00	1.50
** SUBTOTAL **	428	17,928.00	24,694.54	

Table IV.1.6

Guam May 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	2	19.00	38.00	2.00
Jacks	6	73.00	109.50	1.50
Bottom fish	8	139.00	251.00	1.81
Gindai (flower snap)	3	102.50	230.62	2.25
Onaga (red snapper)	3	135.00	334.12	2.47
Opakapaka (pink snp)	2	6.50	14.62	2.25
Uku (gray snapper)	2	12.00	18.00	1.50
Reef fish	51	1,253.70	2,484.80	1.98
Rabbitfish (hitting)	1	11.00	16.50	1.50
Rabbitfish (menahac)	2	501.00	708.50	1.41
Emperor (mafute)	5	164.75	329.50	2.00
Goatfish	1	9.50	14.25	1.50
Barracuda	8	195.00	292.50	1.50
Dolphin (mahimahi)	101	4,042.75	5,871.62	1.45
Marlin	13	1,979.00	2,201.88	1.11
Sailfish	1	81.00	81.00	1.00
Rainbow runner	6	87.00	130.50	1.50
Wahoo	36	846.00	1,414.01	1.67
Skipjack tuna	84	1,979.50	1,912.75	0.97
Dogtooth tuna	7	239.50	359.25	1.50
Yellowfin tuna	58	2,273.50	3,457.99	1.52
Lobster	2	54.00	139.00	2.57
Octopus	2	8.25	16.50	2.00
** SUBTOTAL **	404	14,212.45	20,426.41	

Table IV.1.7

Guam June 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	3	56.00	112.00	2.00
Jacks	11	168.45	222.67	1.32
Bottom fish	18	426.00	825.00	1.94
Ehu (red snapper)	1	4.00	9.00	2.25
Gindai (flower snap)	6	171.50	385.87	2.25
Grouper	1	208.00	156.00	0.75
Kalikali (pink snap)	2	13.00	26.00	2.00
Lehi (silverjaw)	1	18.00	40.50	2.25
Onaga (red snapper)	3	175.50	438.75	2.50
Opakapaka (pink snp)	6	113.00	254.26	2.25
Uku (gray snapper)	4	54.50	81.75	1.50
Reef fish	24	886.50	1,760.25	1.99
Rabbitfish (hitting)	1	6.00	9.00	1.50
Snapper	1	37.50	56.25	1.50
Barracuda	10	160.50	199.86	1.25
Dolphin (mahimahi)	12	243.25	364.88	1.50
Marlin	19	3,262.00	2,927.03	0.90
Sailfish	2	601.00	601.00	1.00
Rainbow runner	11	333.00	452.81	1.36
Wahoo	38	888.00	1,506.52	1.70
Skipjack tuna	68	2,749.50	2,910.13	1.06
Dogtooth tuna	10	321.25	462.13	1.44
Yellowfin tuna	52	2,282.00	3,877.00	1.70
Lobster	1	59.00	177.00	3.00
** SUBTOTAL **	305	13,237.45	17,855.66	

Table IV.1.8

Guam July 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Jacks	6	255.00	352.25	1.38
Bottom fish	16	740.00	1,459.50	1.97
Ehu (red snapper)	1	8.00	18.00	2.25
Gindai (flower snap)	5	65.00	146.25	2.25
Grouper	1	4.50	9.00	2.00
Kalikali (pink snap)	2	25.00	50.00	2.00
Onaga (red snapper)	3	93.50	233.75	2.50
Opakapaka (pink snp)	4	187.00	420.75	2.25
Uku (gray snapper)	7	114.00	169.75	1.49
Reef fish	17	494.00	891.25	1.80
Emperor (mafute)	1	5.00	10.00	2.00
Barracuda	7	118.50	154.25	1.30
Dolphin (mahimahi)	3	21.00	42.00	2.00
Marlin	30	3,379.00	2,798.26	0.83
Sailfish	2	74.00	70.50	0.95
Rainbow runner	12	354.00	508.38	1.44
Wahoo	48	1,324.50	2,432.16	1.84
Skipjack tuna	107	3,445.15	2,773.52	0.81
Dogtooth tuna	9	347.50	474.88	1.37
Yellowfin tuna	67	3,293.50	5,058.92	1.54
** SUBTOTAL **	348	14,348.15	18,073.37	

Table IV.1.9

Guam August 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	2	126.00	127.00	1.01
Bigeye scad (atulai)	1	62.00	124.00	2.00
Jacks	5	118.50	159.25	1.34
Sharks	1	19.00	23.75	1.25
Bottom fish	11	293.50	570.12	1.94
Ehu (red snapper)	2	44.00	99.00	2.25
Gindai (flower snap)	4	82.00	184.49	2.25
Grouper	1	303.50	303.50	1.00
Kalikali (pink snap)	2	18.00	36.00	2.00
Lehi (silverjaw)	1	17.00	38.25	2.25
Onaga (red snapper)	2	216.00	540.00	2.50
Opakapaka (pink snp)	1	47.50	106.87	2.25
Uku (gray snapper)	1	4.50	6.75	1.50
Reef fish	38	1,535.50	3,042.50	1.98
Barracuda	6	55.50	65.49	1.18
Dolphin (mahimahi)	2	9.00	18.00	2.00
Marlin	24	4,242.25	2,081.22	0.49
Sailfish	1	82.00	41.00	0.50
Rainbow runner	15	205.00	267.74	1.31
Wahoo	51	2,108.25	3,758.65	1.78
Skipjack tuna	69	2,204.00	1,759.35	0.80
Dogtooth tuna	7	253.00	257.87	1.02
Yellowfin tuna	49	2,277.75	2,976.93	1.31
Lobster	1	56.00	168.00	3.00
** SUBTOTAL **	297	14,379.75	16,755.73	

Table IV.1.10

Guam September 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bigeye scad (atulai)	3	316.00	632.00	2.00
Jacks	9	208.50	286.49	1.37
Bottom fish	15	432.25	864.50	2.00
Ehu (red snapper)	1	9.00	20.25	2.25
Gindai (flower snap)	8	97.00	218.24	2.25
Lehi (silverjaw)	1	62.00	139.50	2.25
Onaga (red snapper)	5	134.50	336.25	2.50
Opakapaka (pink snp)	3	72.00	162.00	2.25
Uku (gray snapper)	1	4.00	6.00	1.50
Reef fish	18	616.50	1,221.00	1.98
Barracuda	5	59.50	89.25	1.50
Dolphin (mahimahi)	1	138.00	138.00	1.00
Marlin	17	2,579.25	2,438.05	0.95
Sailfish	1	66.00	49.50	0.75
Rainbow runner	10	157.00	233.12	1.48
Wahoo	33	1,928.25	3,606.48	1.87
Skipjack tuna	54	1,834.50	1,657.75	0.90
Dogtooth tuna	2	42.00	31.50	0.75
Yellowfin tuna	31	1,331.50	2,563.98	1.93
** SUBTOTAL **	218	10,087.75	14,693.86	

Table IV.1.11

Guam October 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	1	112.00	112.00	1.00
Bigeye scad (atulai)	9	852.50	1,705.00	2.00
Jacks	2	137.00	205.50	1.50
Bottom fish	14	438.50	869.50	1.98
Ehu (red snapper)	1	15.00	33.75	2.25
Gindai (flower snap)	4	42.50	95.61	2.25
Grouper	2	257.50	257.50	1.00
Kalikali (pink snap)	1	4.50	10.12	2.25
Onaga (red snapper)	2	130.50	326.25	2.50
Opakapaka (pink snp)	1	36.50	82.13	2.25
Uku (gray snapper)	1	12.00	18.00	1.50
Reef fish	20	677.00	1,352.00	2.00
Barracuda	8	97.50	136.00	1.39
Dolphin (mahimahi)	10	171.50	343.00	2.00
Marlin	6	1,035.50	1,035.50	1.00
Sailfish	2	69.50	71.75	1.03
Rainbow runner	14	343.50	515.25	1.50
Wahoo	72	2,980.50	5,468.44	1.83
Skipjack tuna	79	2,490.94	2,150.68	0.86
Dogtooth tuna	9	284.00	449.99	1.58
Yellowfin tuna	45	2,400.50	4,500.60	1.87
Lobster	5	37.00	111.00	3.00
** SUBTOTAL **	308	12,625.94	19,849.57	

Table IV.1.12

Guam November 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Bottom fish	2	53.00	106.00	2.00
Reef fish	10	161.00	316.25	1.96
Parrotfish	1	4.00	8.00	2.00
Barracuda	5	96.50	144.75	1.50
Dolphin (mahimahi)	10	151.00	266.98	1.77
Marlin	4	412.00	412.00	1.00
Rainbow runner	14	270.00	408.12	1.51
Wahoo	114	4,636.25	7,200.44	1.55
Skipjack tuna	25	1,024.50	897.09	0.88
Dogtooth tuna	2	31.00	46.50	1.50
Yellowfin tuna	30	1,913.00	3,104.35	1.62
** SUBTOTAL **	217	8,752.25	12,910.48	

Table IV.1.13

Guam December 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Jacks	3	42.00	57.87	1.38
Bottom fish	2	44.00	88.00	2.00
Ehu (red snapper)	1	2.50	5.62	2.25
Onaga (red snapper)	1	25.50	63.75	2.50
Reef fish	8	252.00	465.75	1.85
Emperor (mafute)	3	59.50	119.00	2.00
Barracuda	8	126.50	189.75	1.50
Dolphin (mahimahi)	6	110.00	192.49	1.75
Marlin	4	503.00	503.00	1.00
Rainbow runner	12	175.00	262.50	1.50
Wahoo	85	3,281.75	5,523.93	1.68
Skipjack tuna	26	610.50	604.12	0.99
Dogtooth tuna	3	50.50	75.75	1.50
Yellowfin tuna	22	825.25	1,450.21	1.76
** SUBTOTAL **	184	6,108.00	9,601.74	
** TOTAL **	3,722	159,715.61	227,828.37	

Figure IV.1.1

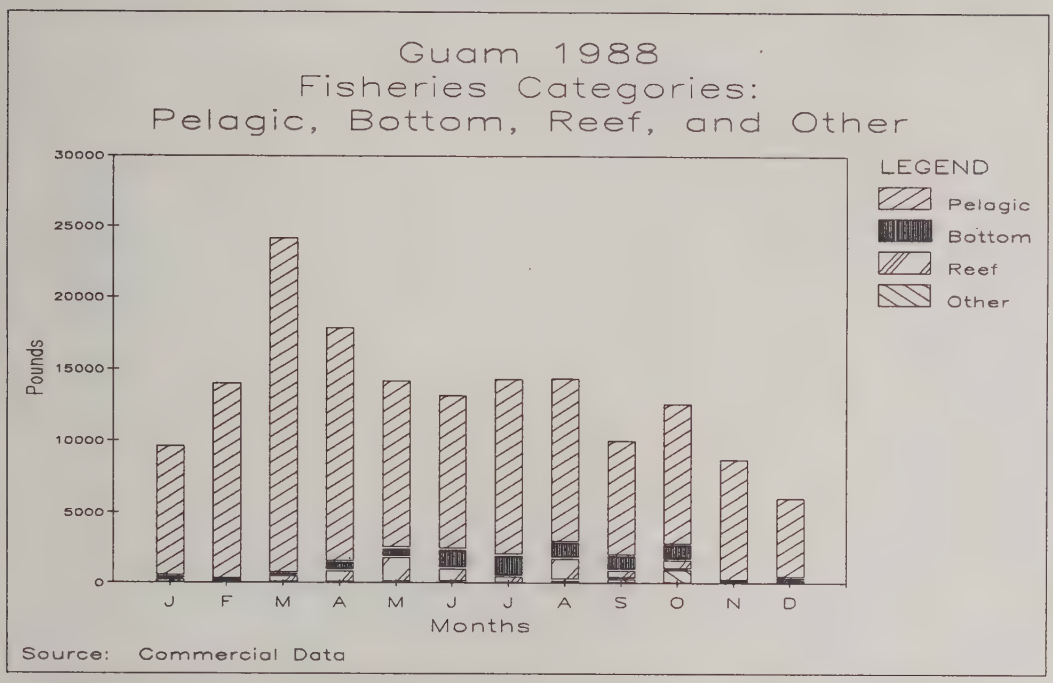


Figure IV.1.2

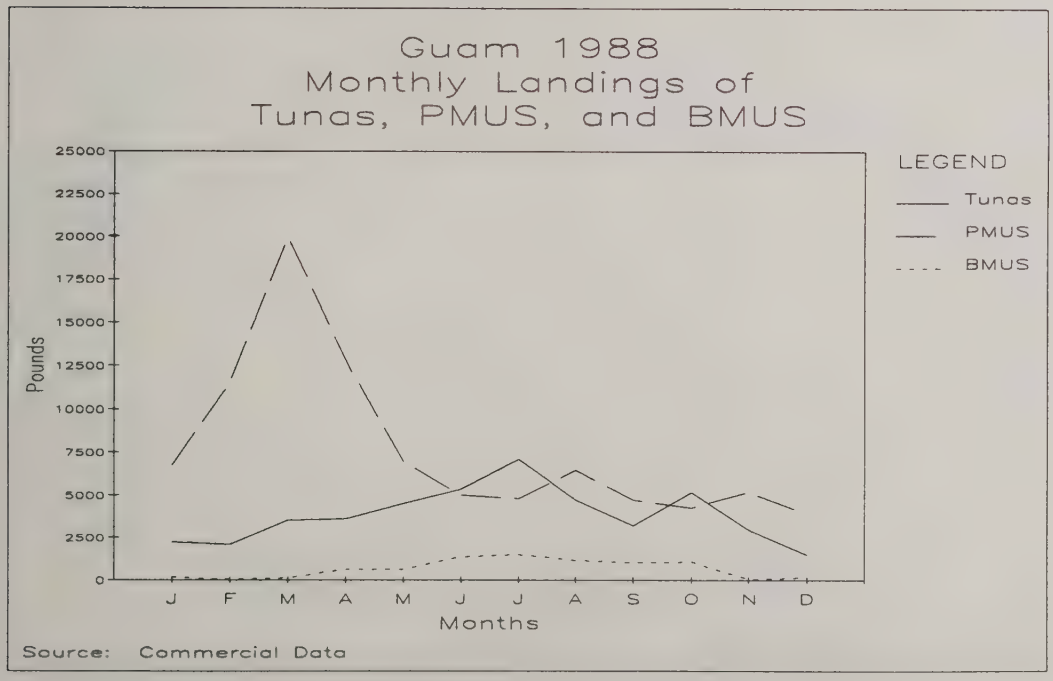


Figure IV.1.3

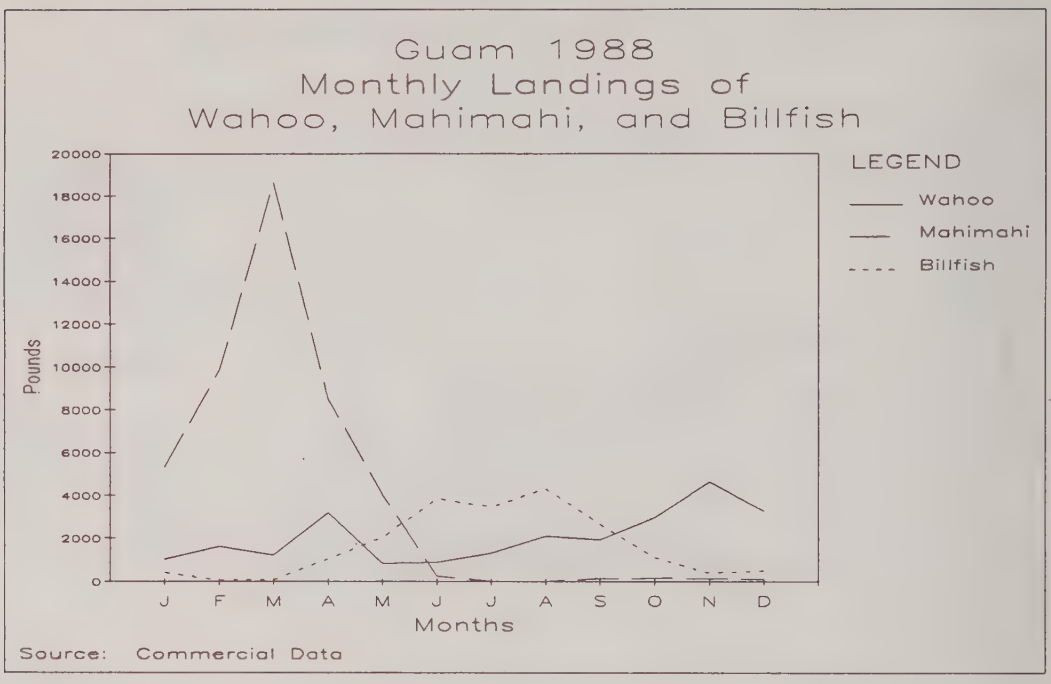


Figure IV.1.4

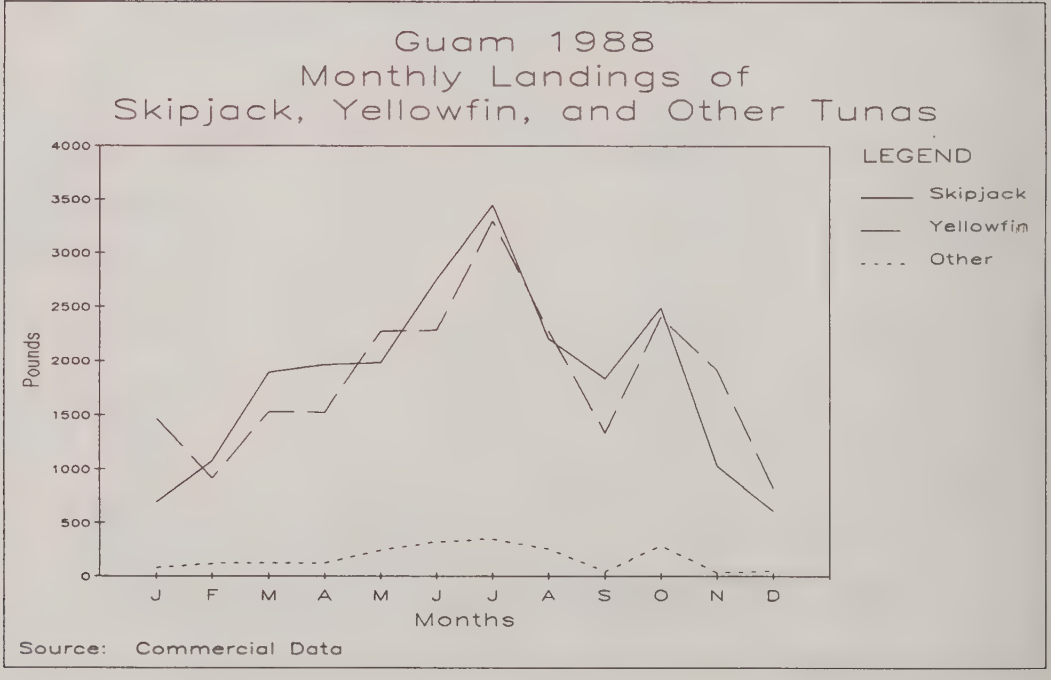
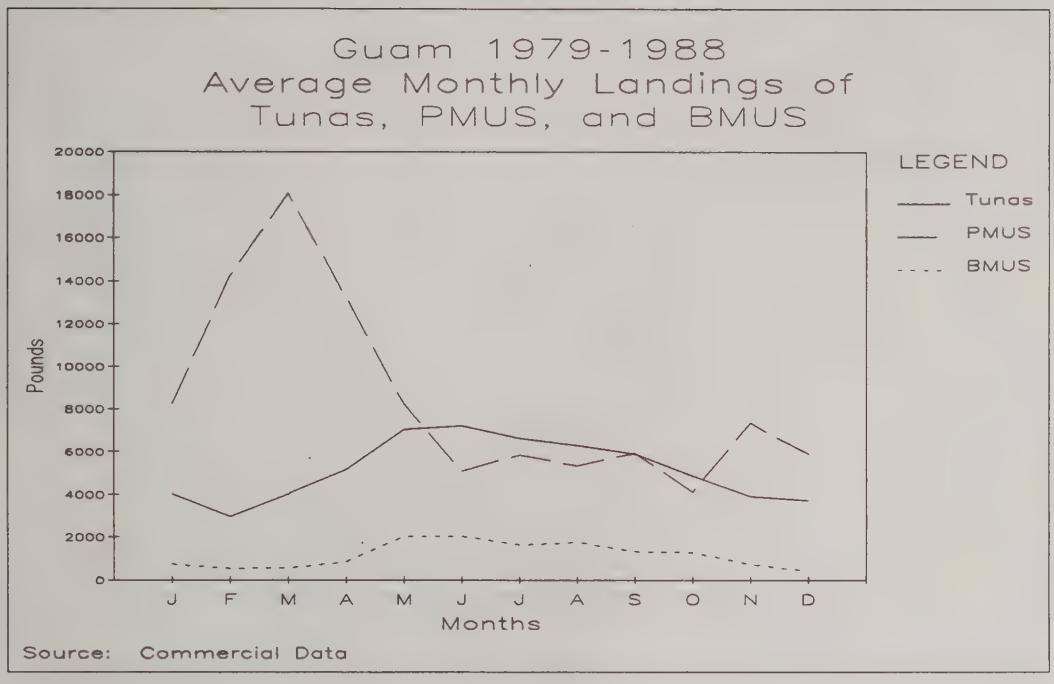


Figure IV.2.1



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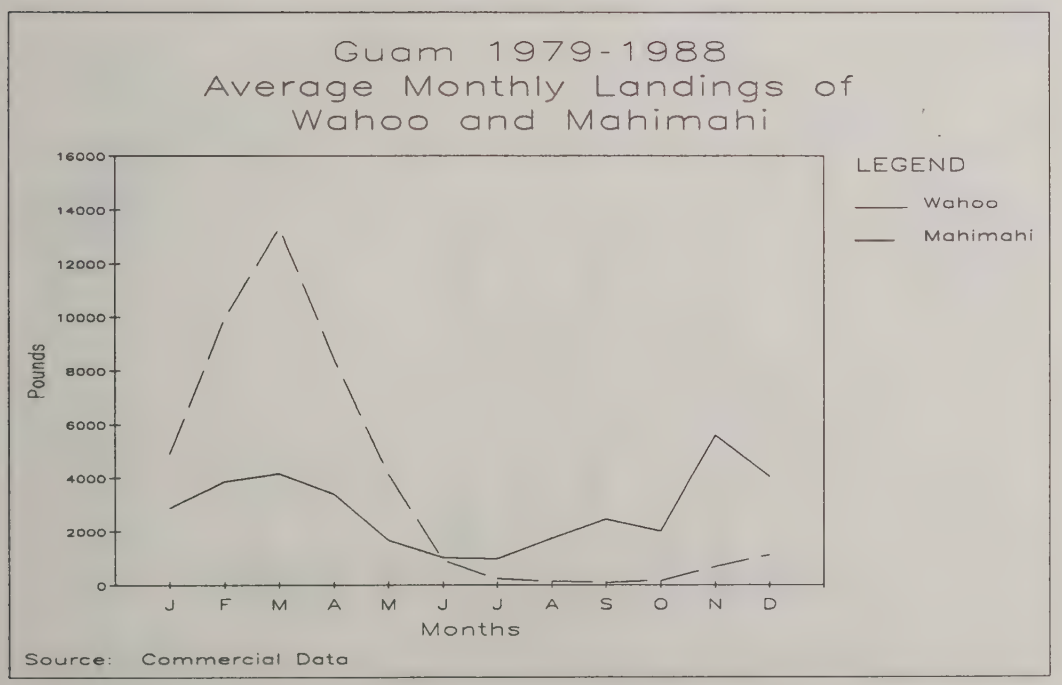

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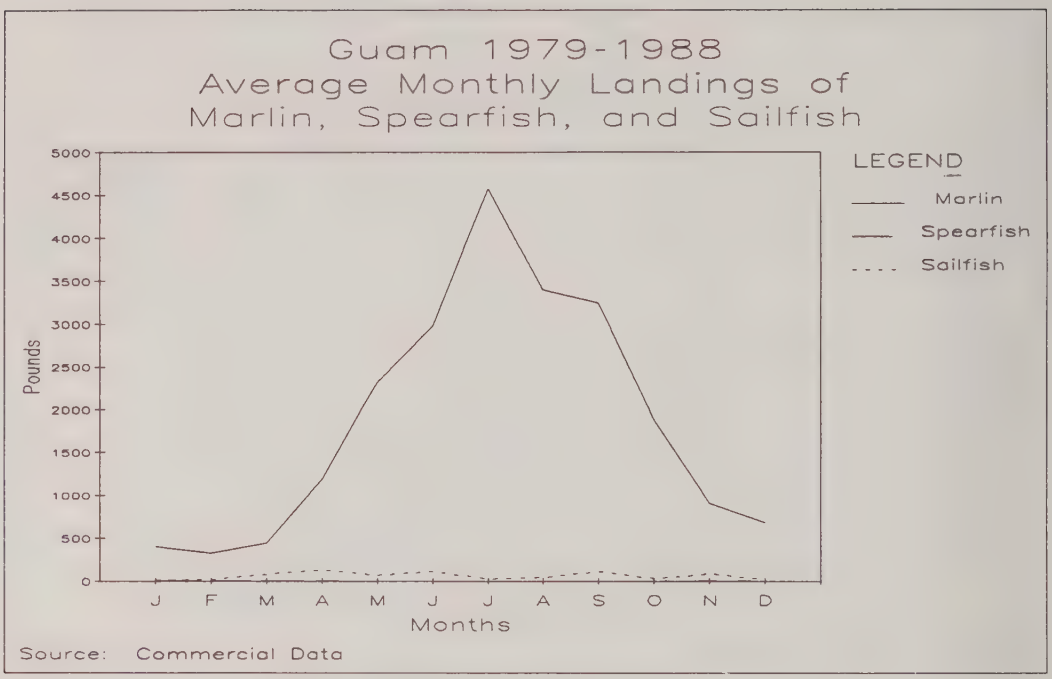

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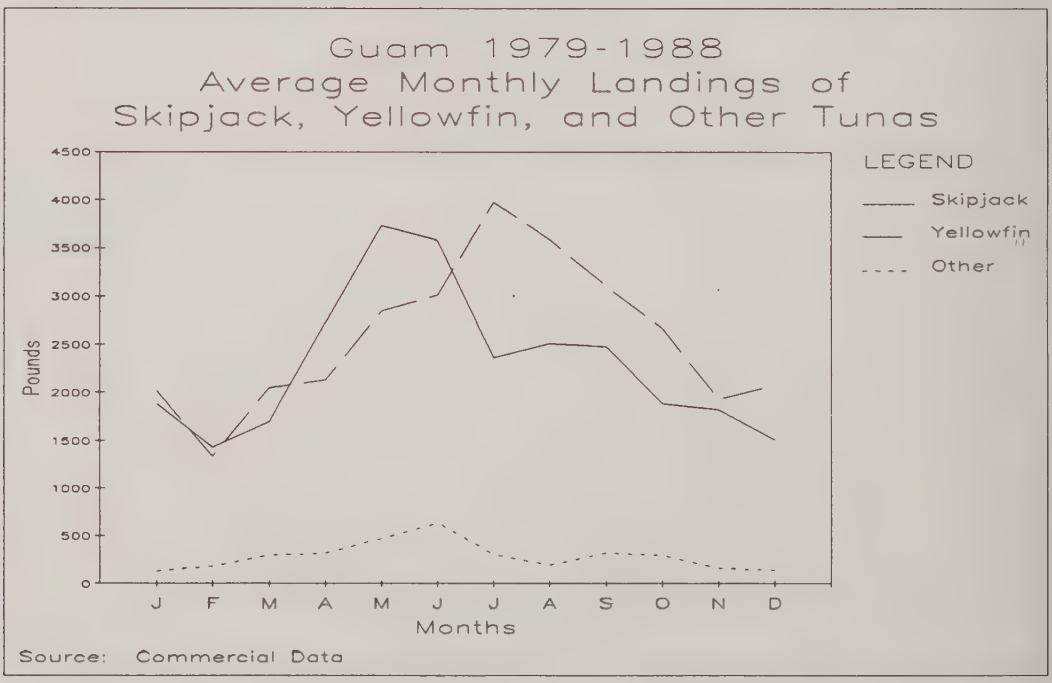
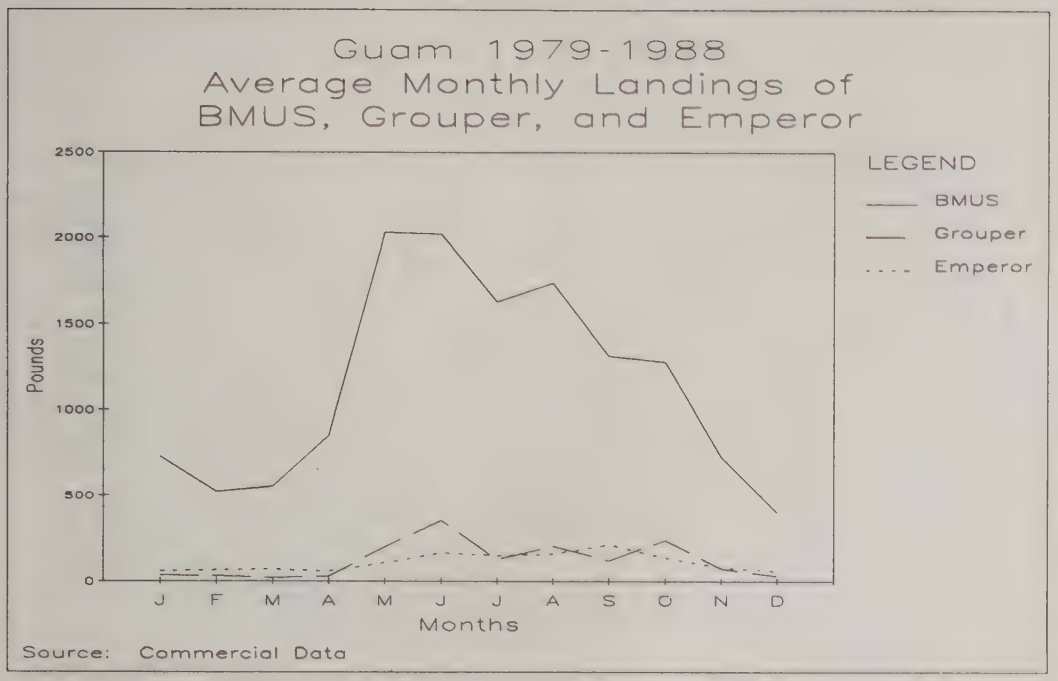


Figure IV.2.5



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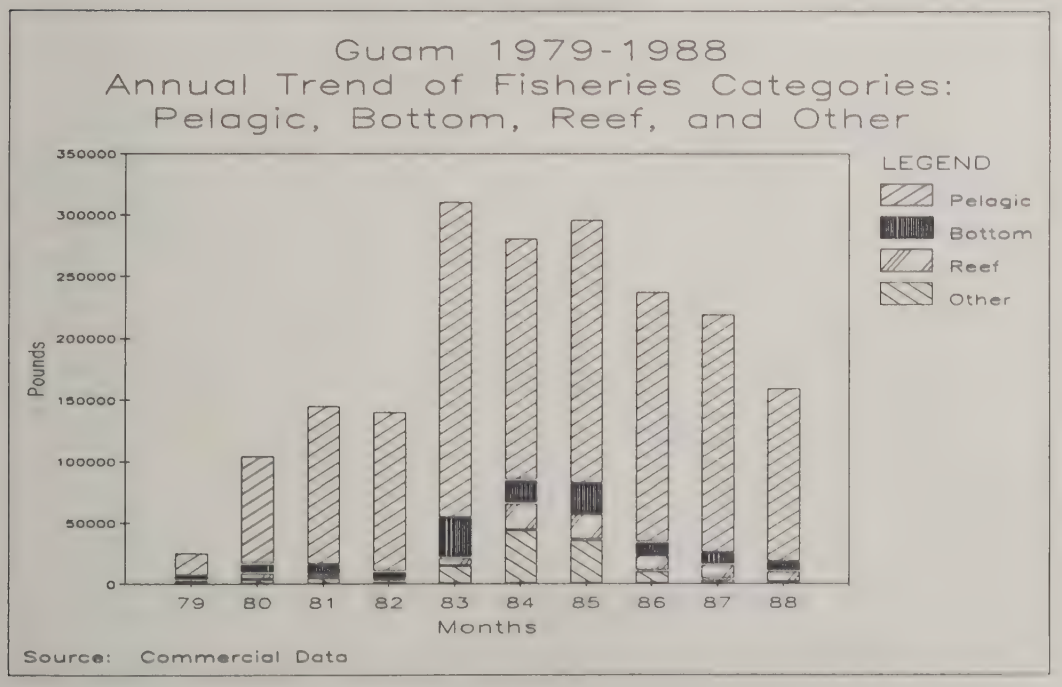

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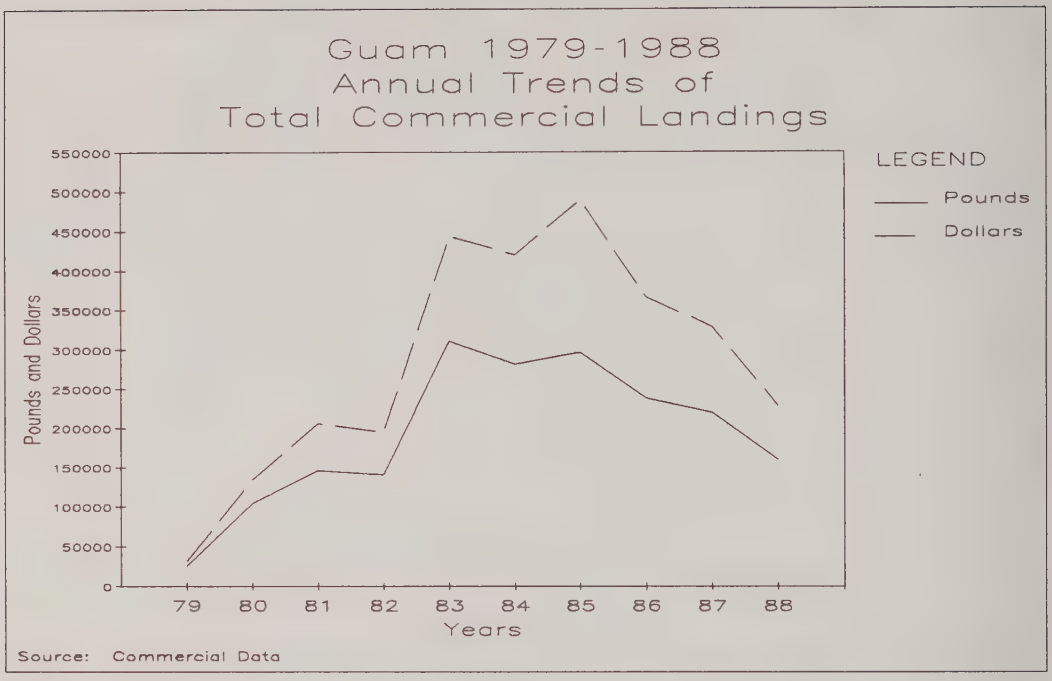

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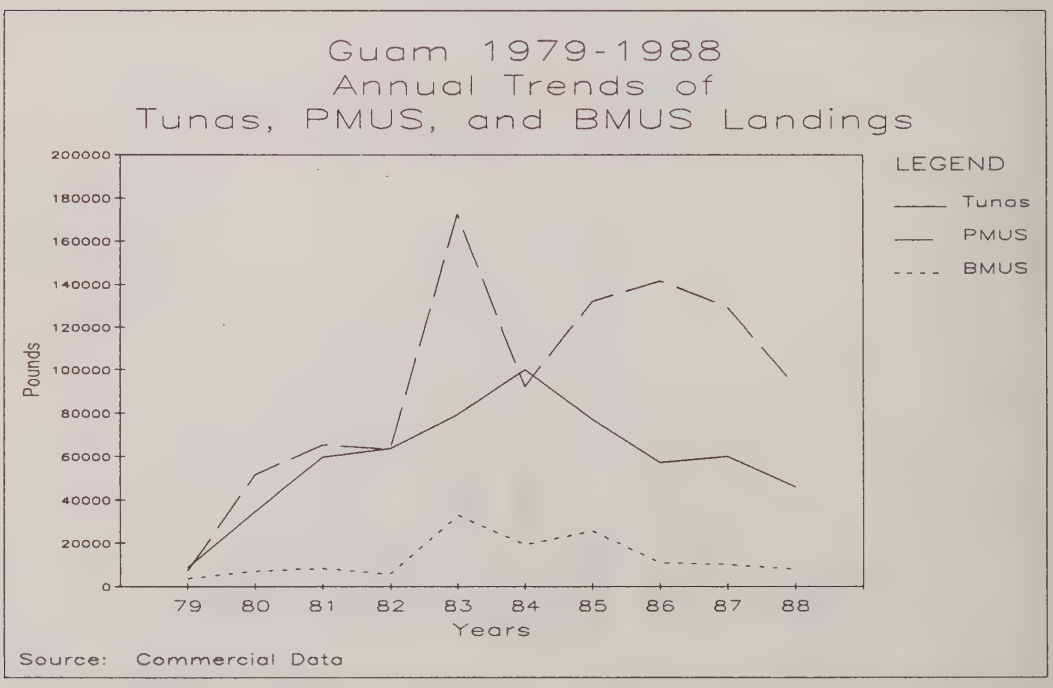

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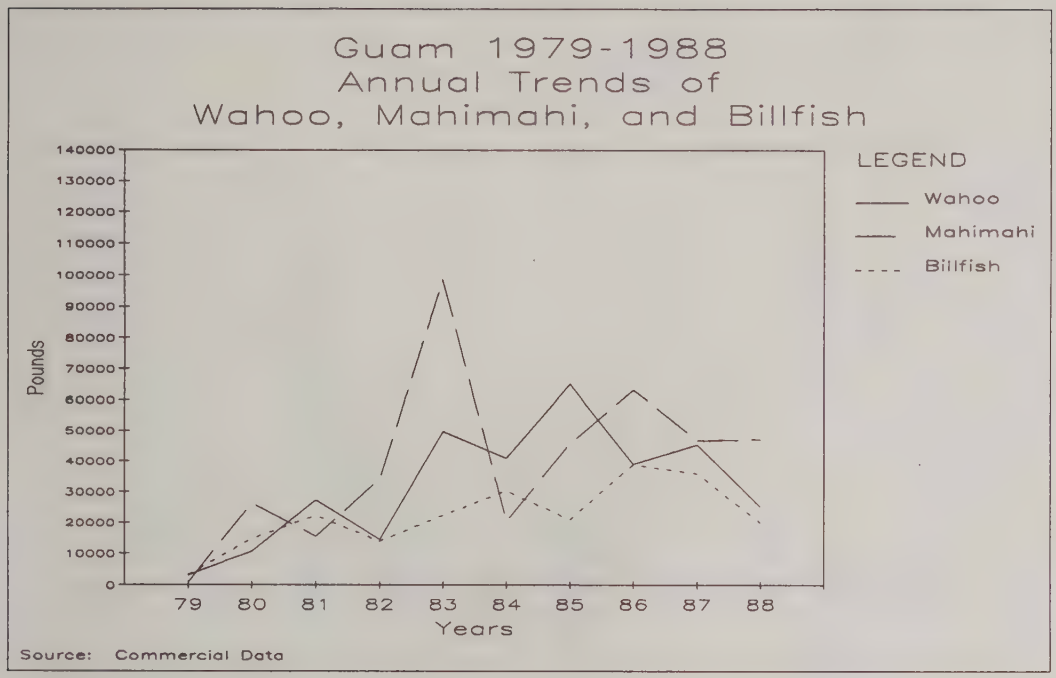

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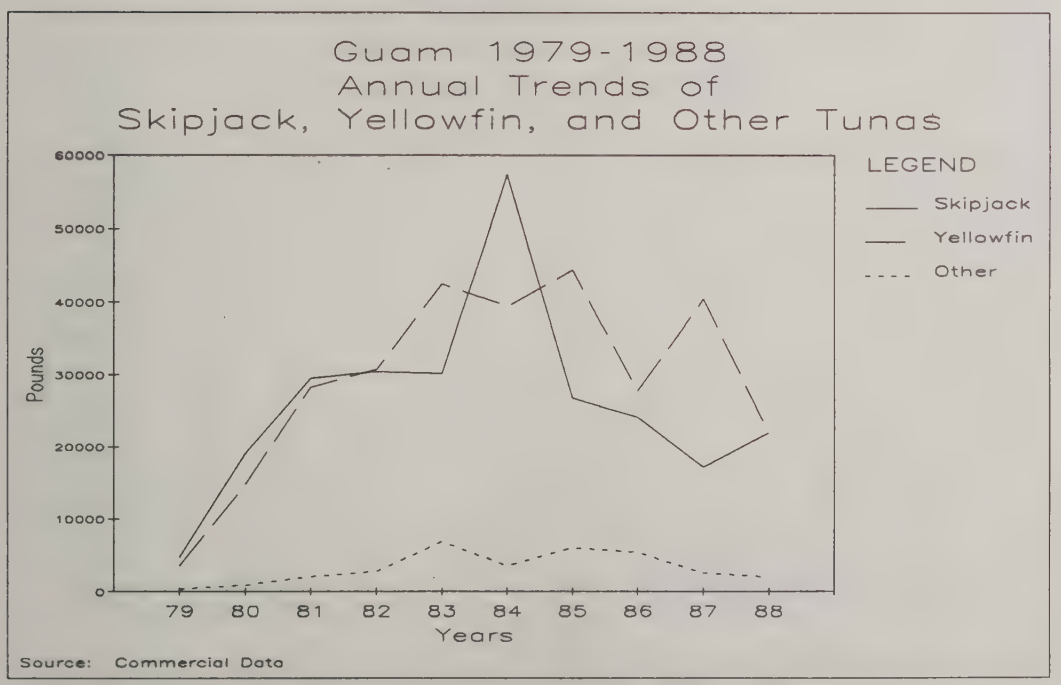
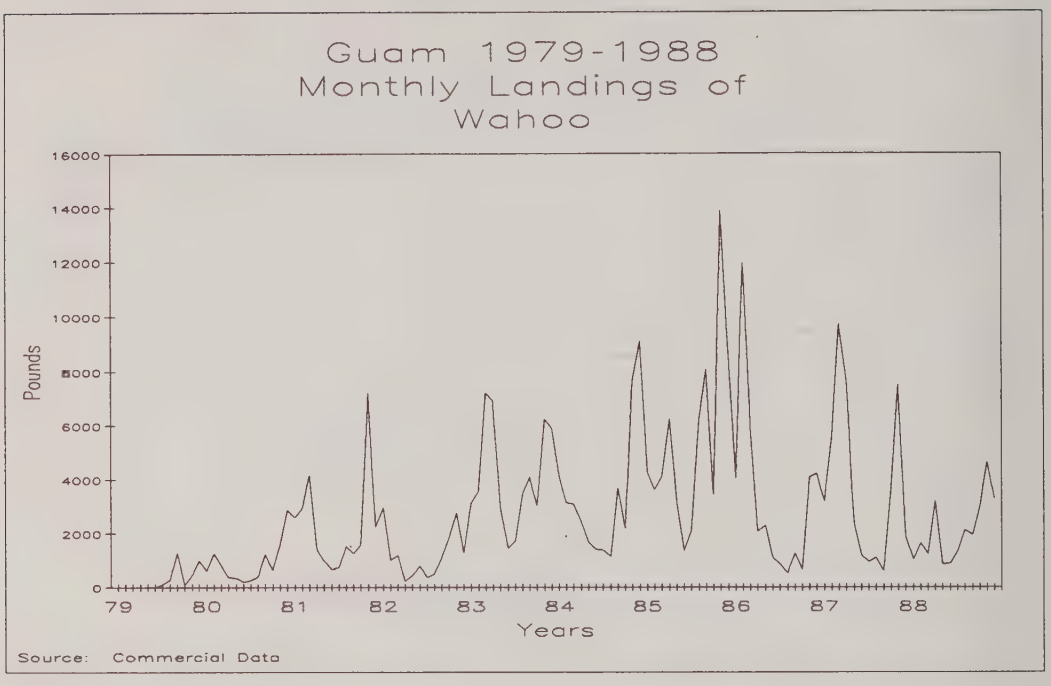


Figure IV.4.1



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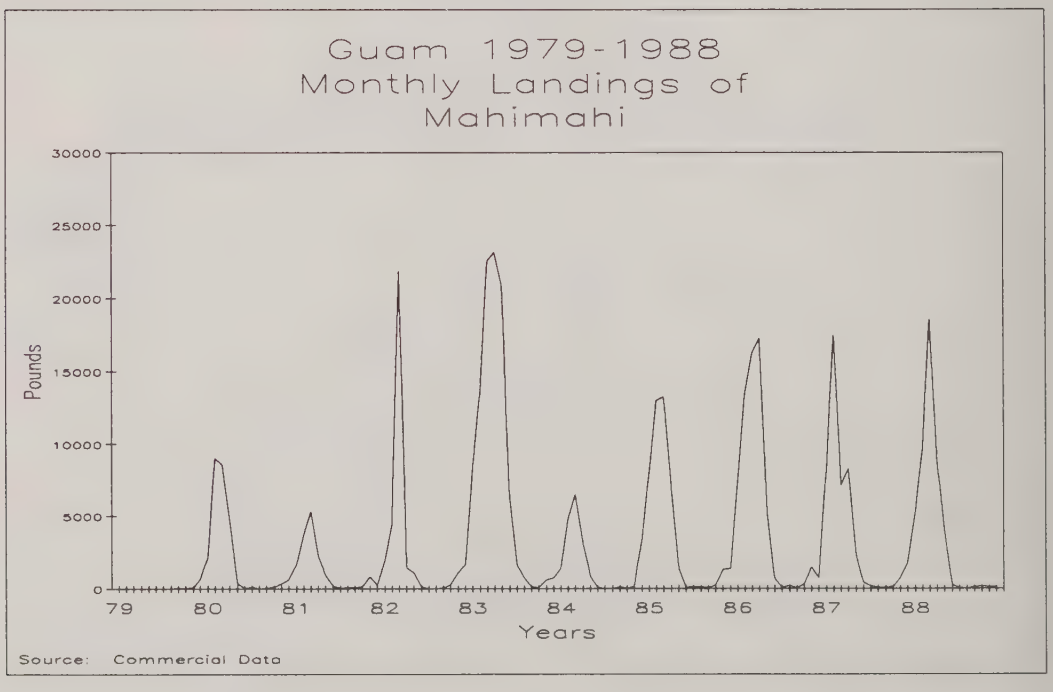
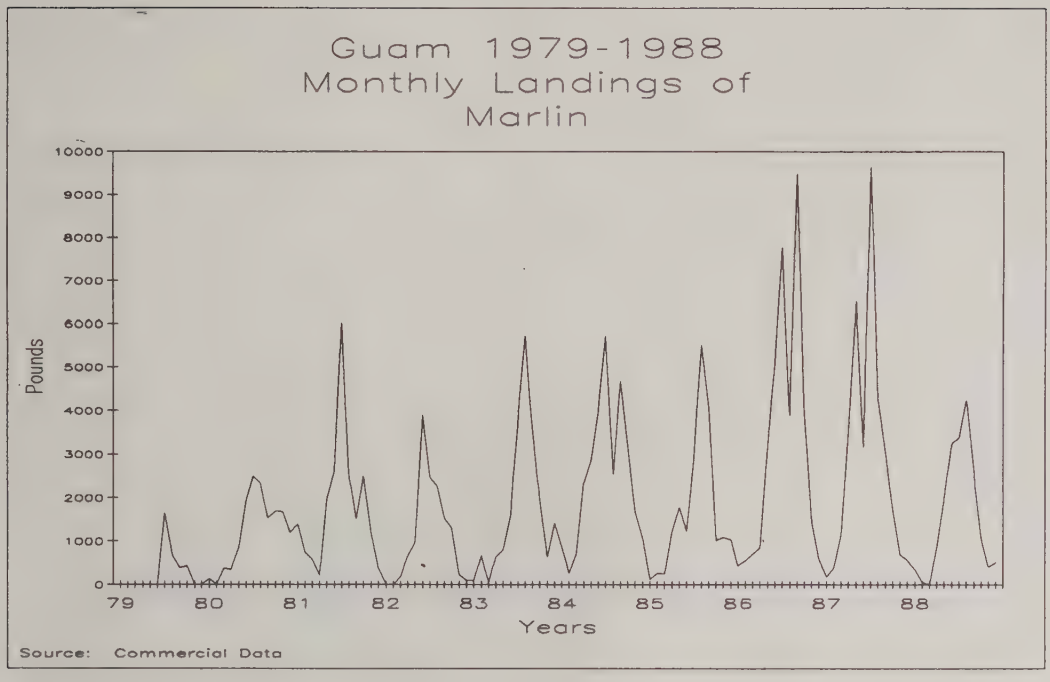


Figure IV.4.3



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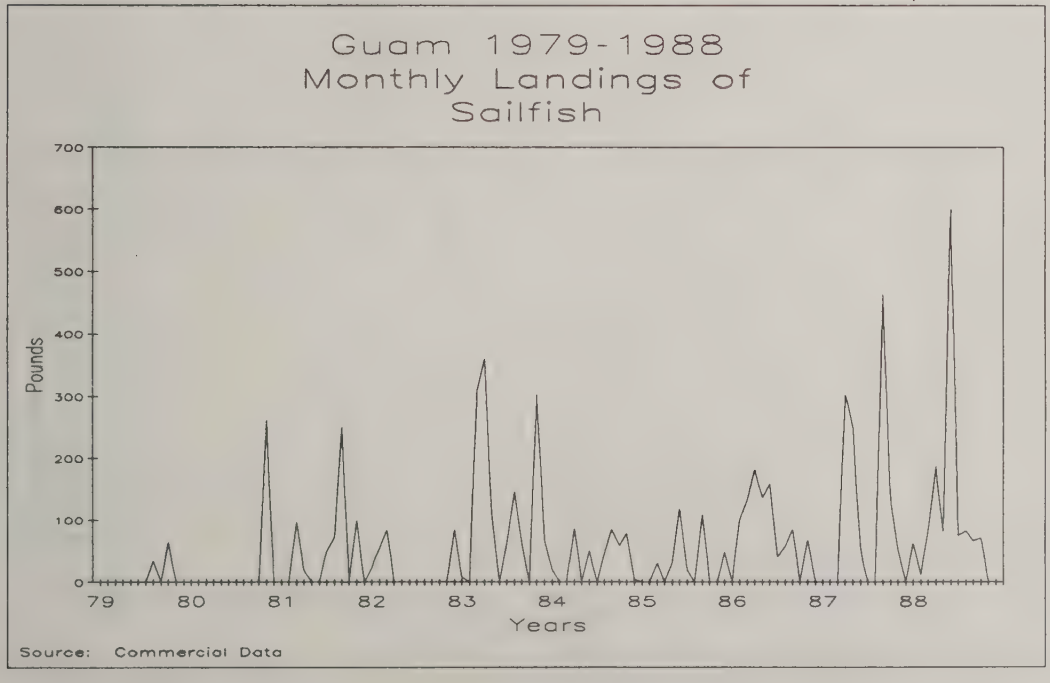

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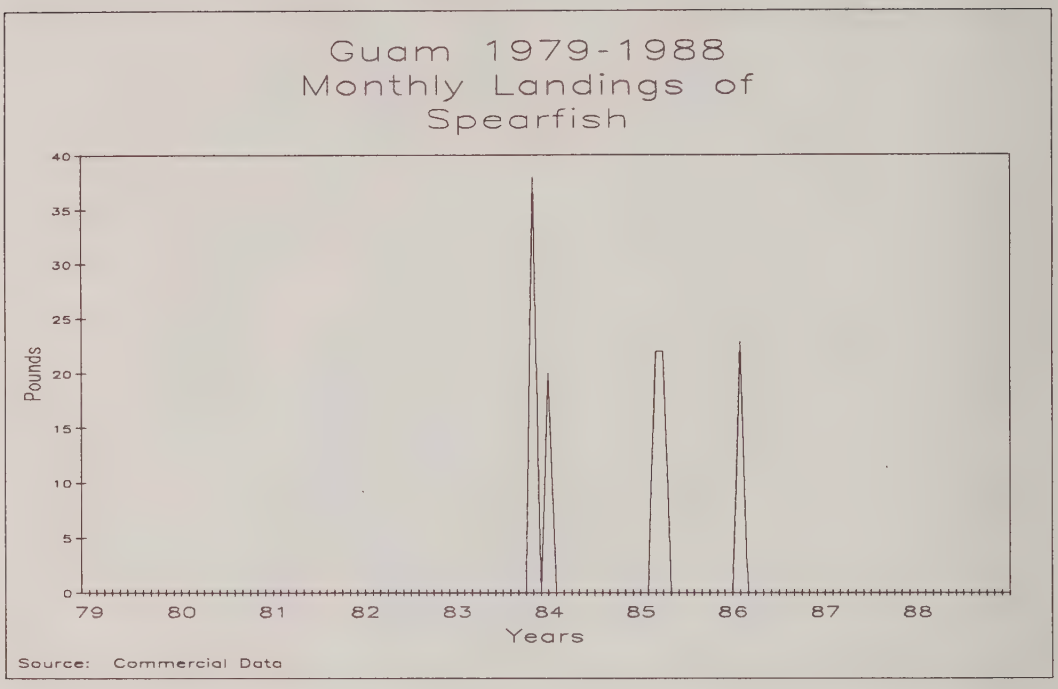


Figure IV.4.6

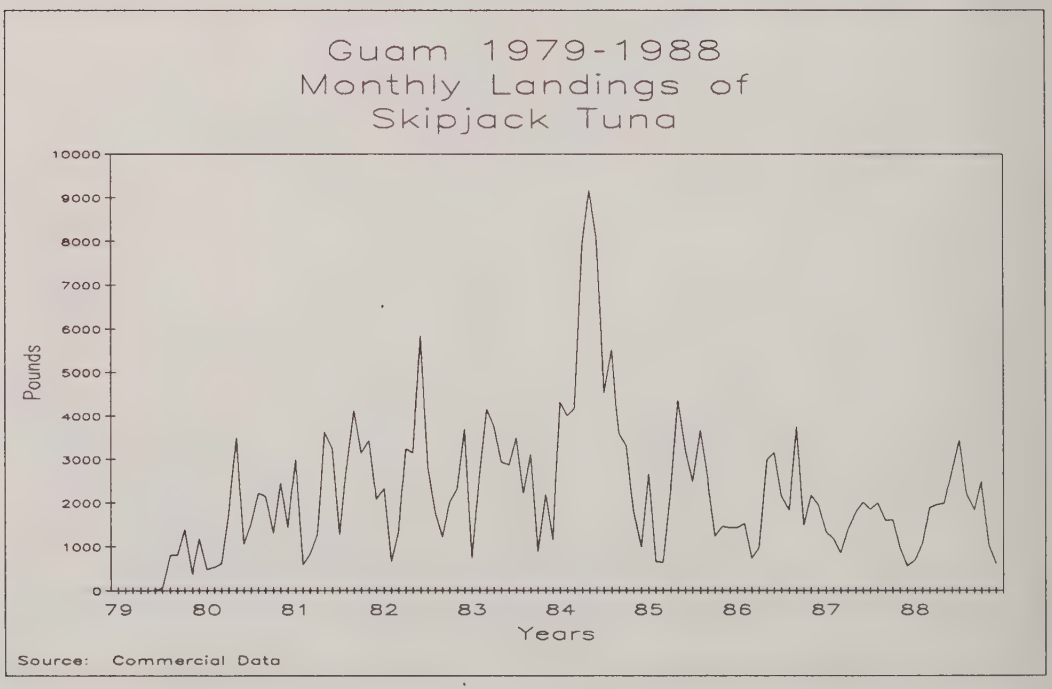


Figure IV.4.7

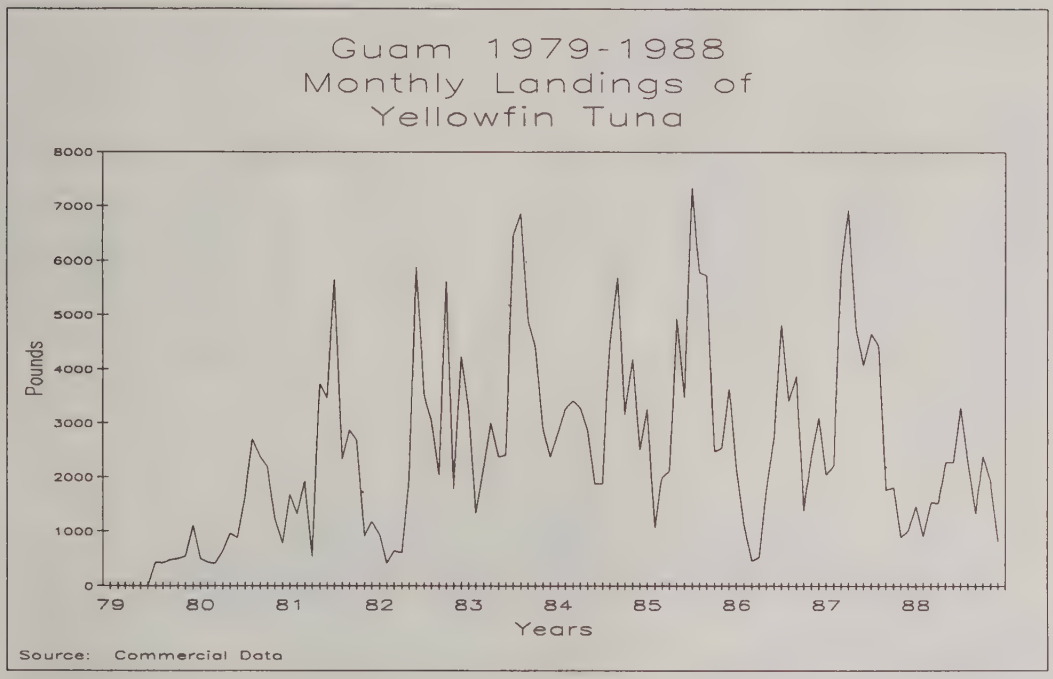
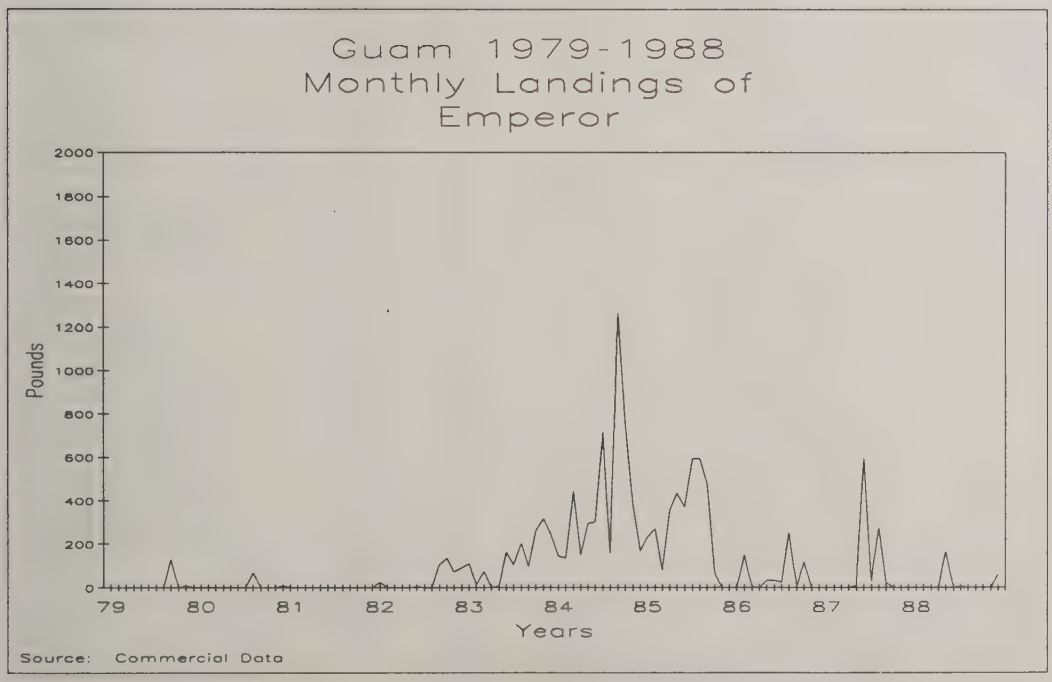


Figure IV.4.8



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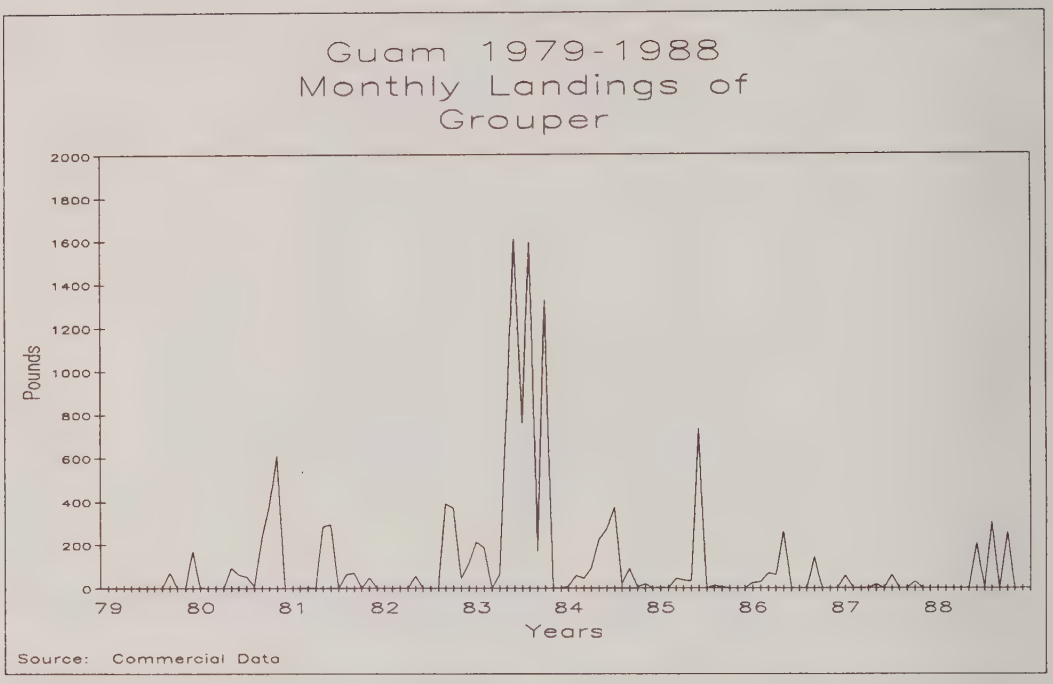

Guam 1979-1988
Monthly Landings of
Grouper
Pounds
2000
1800
1600
1400
1200
1000
800
600
400
200
0
79
80
81
82
83
84
85
86
87
88
Years
Source: Commercial Data

Table IV.2.1

Guam DAWR 1988 Annual
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	772884.2	13	58874.0	7	12454.2	6	213487.6	7	45645.6	7	12.0	10
Bottom fish	53729.4	19	10043.6	14	2605.5	12	27786.1	14	7503.7	13	4.8	8
Atulai jig	13084.9	57	998.7	47	220.6	49	2454.0	49	553.7	51	13.6	25
Spear snorkel	16327.2	30	1309.1	26	505.3	21	3621.7	29	1378.8	24	13.8	40
Spear scuba	7859.5	34	500.7	25	314.8	26	1037.9	28	708.9	31	14.8	59
Other	1708.1	48	236.5	39	116.7	41	565.6	39	267.0	40	6.8	47
Total:	865593.3	12	71962.7	6	13825.7	6	248952.9	6	49180.3	6	11.2	8

Table IV.2.2

Guam DAWR Annual 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	6325.5	0.73	3745.4	0.48	1811.3	3.37	768.8	1.97
Rays	1584.7	0.18	0	0	1584.7	2.95	0	0
Moray eels	637.0	0.07	0	0	0	0	637.0	1.63
Conger eels	370.8	0.04	0	0	370.8	0.69	0	0
Lizardfish	31.1	0	0	0	31.1	0.06	0	0
Bearfish	39.6	0	0	0	39.6	0.07	0	0
Needlefish	129.1	0.01	129.1	0.02	0	0	0	0
Squirrelfish	1716.8	0.20	0	0	1259.6	2.34	457.3	1.17
Scorpionfish	111.0	0.01	0	0	56.5	0.11	54.6	0.14
Grouper	7295.8	0.84	0	0	6701.9	12.47	593.9	1.52
Flagtails	5.8	0	0	0	0	0	5.8	0.01
Bigeyes	40.7	0	0	0	35.9	0.07	4.8	0.01
Cardinalfish	12.7	0	0	0	12.7	0.02	0	0
False whiting	23.1	0	0	0	23.1	0.04	0	0
Jacks	8366.8	0.97	1398.6	0.18	6052.0	11.26	916.2	2.35
Rainbow runner	11200.2	1.29	10753.2	1.39	411.1	0.77	35.8	0.09
Bigeye scad (akule)	12976.1	1.50	0	0	0	0	12976.1	33.29
Dolphinfish (mahimahi)	310032.1	35.82	310032.1	40.11	0	0	0	0
Pomfret	215.5	0.02	0	0	215.5	0.40	0	0
Snappers	2950.5	0.34	182.2	0.02	2501.7	4.66	266.7	0.68
Lehi (silvermouth)	1728.2	0.20	0	0	1728.2	3.22	0	0
Uku (jobfish)	4023.2	0.46	104.2	0.01	3569.2	6.64	349.8	0.90
Ehu (pink snapper)	2108.2	0.24	0	0	2108.2	3.92	0	0
Onaga (red snapper)	1147.3	0.13	0	0	1147.3	2.14	0	0
Blue lined snapper	1164.2	0.13	0	0	1125.3	2.09	39.0	0.10
Yellowtail kalikali	1442.7	0.17	0	0	1442.7	2.69	0	0
Opakapaka (pink snap)	264.6	0.03	0	0	264.6	0.49	0	0
Yelloweye opakapaka	730.2	0.08	0	0	730.2	1.36	0	0
Kalikali (pink snapper)	66.6	0.01	0	0	66.6	0.12	0	0
Gindai (flower snapper)	1667.7	0.19	0	0	1667.7	3.10	0	0
Sweetlips	254.9	0.03	0	0	34.1	0.06	220.8	0.57
Emperors	12082.4	1.40	0	0	11799.6	21.96	282.8	0.73
Goatfish	1087.8	0.13	0	0	710.4	1.32	377.4	0.97
Sweepers	4.9	0	0	0	0	0	4.9	0.01
Rudderfish	974.2	0.11	0	0	0	0	974.2	2.50

Table IV.2.2 (cont.)

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Butterflyfish	2.4	0	0	0	0	0	2.4	0.01
Angelfish	3.5	0	0	0	0	0	3.5	0.01
Hawkfish	1.9	0	0	0	1.9	0	0	0
Mullet	7.8	0	0	0	0	0	7.8	0.02
Barracuda	5614.9	0.65	5126.9	0.66	488.1	0.91	0	0
Wrasse	1649.3	0.19	0	0	465.6	0.87	1183.8	3.04
Parrotfish	6912.2	0.80	0	0	0	0	6912.2	17.73
Surgeonfish and tangs	4738.2	0.55	0	0	115.4	0.21	4622.8	11.86
Rabbitfish	126.1	0.01	0	0	0	0	126.1	0.32
Tunas	16.7	0	16.7	0	0	0	0	0
Wahoo	99801.1	11.53	99801.1	12.91	0	0	0	0
Kawakawa	3497.0	0.40	3497.0	0.45	0	0	0	0
Dogtooth tuna	5963.8	0.69	4331.7	0.56	1632.1	3.04	0	0
Skipjack tuna	184837.7	21.35	184837.7	23.92	0	0	0	0
Yellowfin tuna	77433.5	8.95	77315.6	10.00	117.9	0.22	0	0
Sailfish	1145.1	0.13	1145.1	0.15	0	0	0	0
Blue marlin	68510.9	7.91	68510.9	8.86	0	0	0	0
Shortbill spearfish	1957.0	0.23	1957.0	0.25	0	0	0	0
Flounder	2.7	0	0	0	0	0	2.7	0.01
Triggerfish	738.4	0.09	0	0	738.4	1.37	0	0
Tripletooth puffers	31.7	0	0	0	31.7	0.06	0	0
Assorted bottom fish	538.8	0.06	0	0	538.8	1.00	0	0
Shallow bottom fish	1362.8	0.16	0	0	1362.8	2.54	0	0
Deep bottom fish	735.3	0.08	0	0	735.3	1.37	0	0
Assorted reef fish	3654.2	0.42	0	0	0	0	3654.2	9.37
Mollusks	2356.6	0.27	0	0	0	0	2356.6	6.05
Squid	7.0	0	0	0	0	0	7.0	0.02
Octopus	172.2	0.02	0	0	0	0	172.2	0.44
Spiny lobsters	776.8	0.09	0	0	0	0	776.8	1.99
Slipper lobsters	53.8	0.01	0	0	0	0	53.8	0.14
Crabs	131.8	0.02	0	0	0	0	131.8	0.34
Total all species:	865593.3	100.00	772884.2	89.29	53729.4	6.21	38979.7	4.50

Table IV.3.1

Guam DAWR January 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	12727.7	42	2664.5	11	575.9	14	13555.7	2	3014.2	17	4.5	29
Bottom fish	363.0	66	101.8	76	24.5	66	147.1	66	47.2	71	5.3	0*
Spear snorkel	2092.5	95	23.8	95	11.9	95	47.5	95	23.8	95	88.1	0*
Total:	15183.2	34	2790.0	12	564.2	13	13750.3	2	2956.0	16	6.0	24

Table IV.3.2

Guam DAWR February 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	85277.1	14	6318.9	6	1470.0	9	27264.5	6	6411.7	9	13.5	13
Bottom fish	231.9	88	87.9	88	35.2	88	197.8	88	79.1	88	2.6	0*
Total:	85509.1	14	6406.8	5	1470.8	9	27462.3	5	6414.4	9	13.3	13

Table IV.3.3

Guam DAWR March 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	170942.6	30	8119.7	32	1515.8	32	30384.2	30	5679.7	30	20.7	16
Bottom fish	355.9	62	219.9	40	73.3	36	600.9	48	195.6	42	2.0	38*
Spear snorkel	174.8	95	39.3	95	34.9	95	39.3	95	34.9	95	4.4	0*
Other	700.6	95	43.7	95	17.5	95	131.0	95	52.4	95	16.0	0*
Total:	172173.8	30	8422.5	31	1527.9	29	31155.3	30	5677.1	28	19.7	13

* Not enough data to properly compute Coefficient of Variation (CV).

Table IV.3.4

Guam DAWR April 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	103968.8	9	6249.4	6	1157.6	6	22367.4	10	4117.4	2	17.8	8
Bottom fish	9696.0	39	1602.4	40	375.0	23	3972.0	39	900.8	18	5.8	8
Spear snorkel	21.8	89	12.0	89	20.8	89	23.9	89	41.6	89	1.8	0*
Spear scuba	509.6	89	52.1	89	20.8	89	52.1	89	20.8	89	9.8	0*
Total:	114196.2	11	7915.8	4	1204.9	8	26415.4	5	4148.5	4	15.2	12

Table IV.3.5

Guam DAWR May 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	71868.9	53	4690.7	29	938.1	24	14879.9	30	3021.5	25	12.6	31
Bottom fish	3672.6	29	1108.8	31	242.1	22	2946.8	9	713.0	12	3.6	16
Atulai jig	0	0	78.1	89	7.8	89	156.3	89	15.6	89	0	0*
Spear snorkel	3710.1	68	417.2	58	125.4	50	1117.8	69	325.1	63	8.6	40
Spear scuba	1715.1	71	76.1	27	41.7	43	147.4	45	92.3	58	25.5	3*
Total:	80966.7	50	6370.9	30	1079.0	20	19248.1	28	3594.7	19	10.5	22

Table IV.3.6

Guam DAWR June 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	31548.1	40	2658.2	23	699.6	18	10535.1	20	2764.9	16	13.3	52
Bottom fish	3852.3	38	660.9	21	218.5	28	1811.3	18	590.6	24	6.1	41*
Atulai jig	228.7	87	53.2	87	13.3	87	106.4	87	26.6	87	4.3	0*
Spear snorkel	1136.9	63	91.6	56	61.9	37	255.2	53	206.4	46	13.7	108*
Spear scuba	382.5	42	78.5	54	63.3	53	134.7	57	111.6	56	6.4	66*
Total:	37148.5	39	3542.5	18	834.8	17	12842.7	15	2801.5	20	10.6	31

* Not enough data to properly compute Coefficient of Variation (CV).

Table IV.3.7

Guam DAWR July 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	90521.3	28	5325.7	7	1143.5	5	18027.9	2	3891.2	3	17.4	22
Bottom fish	7887.1	24	2270.4	21	518.8	10	5915.3	13	1363.2	7	3.7	26
Spear snorkel	584.1	75	177.3	66	77.0	74	565.1	67	249.9	75	3.6	0*
Spear scuba	1876.0	95	77.1	91	52.5	78	157.3	89	115.1	74	12.7	0*
Other	350.4	77	80.5	67	38.5	74	226.6	69	101.3	72	3.9	0*
Total:	101218.9	28	7931.0	9	1427.5	10	24892.1	1	4712.5	3	13.7	18

Table IV.3.8

Guam DAWR August 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	79915.0	36	6306.8	12	1326.1	13	16446.4	19	4619.1	16	13.2	38
Bottom fish	7422.3	62	979.5	43	283.4	29	3556.2	36	1260.7	33	5.3	20
Atulai jig	116.6	82	3.3	82	6.6	82	9.9	82	19.8	82	35.3	0*
Spear snorkel	5381.7	50	353.6	14	92.6	3	1094.0	15	284.4	5	16.5	39
Spear scuba	1512.4	36	93.6	46	73.6	64	280.6	60	238.5	73	18.3	73*
Other	562.8	60	105.5	65	53.0	64	176.9	49	87.0	45	5.8	145*
Total:	94910.8	29	7842.3	11	1625.1	12	21564.0	17	5561.5	15	13.0	26

Table IV.3.9

Guam DAWR September 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	32328.0	29	3692.7	30	692.8	30	12523.7	26	2364.0	27	8.9	48*
Bottom fish	5612.1	51	1033.5	43	275.4	39	3355.0	45	886.8	40	5.0	24*
Atulai jig	1580.2	88	57.7	88	11.5	88	230.8	88	46.2	88	27.4	0*
Spear snorkel	916.4	65	78.7	51	44.9	48	253.3	43	146.3	40	9.6	73*
Total:	40436.7	28	4862.5	26	834.8	28	16362.8	23	2901.6	26	8.3	30*

* Not enough data to properly compute Coefficient of Variation (CV).

Table IV.3.10

Guam DAWR October 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	19165.0	31	3003.7	19	849.6	17	10655.1	25	2990.1	23	6.4	10
Bottom fish	6186.5	25	974.3	19	253.0	25	2607.8	17	667.8	19	6.2	25*
Atulai jig	10851.8	47	763.2	25	164.9	38	1850.3	35	405.6	47	13.8	20
Spear snorkel	664.8	90	56.9	90	19.0	90	56.9	90	19.0	90	11.7	0*
Total:	36868.2	27	4798.1	12	1035.7	19	15170.1	20	3391.7	23	7.9	22

Table IV.3.11

Guam DAWR November 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	41167.3	19	4984.3	9	1103.5	11	16625.4	15	3728.4	19	8.9	35
Bottom fish	4531.2	32	480.8	18	123.0	13	1199.3	27	304.9	23	10.5	73*
Atulai jig	0	0	26.3	90	8.8	90	52.6	90	17.5	90	0	0*
Spear snorkel	176.0	90	26.3	90	8.8	90	26.3	90	8.8	90	6.7	0*
Spear scuba	1092.5	74	91.6	12	45.8	12	196.1	30	98.0	30	10.8	108*
Total:	46967.0	17	5609.4	10	1144.7	11	18099.7	15	3795.2	19	9.4	33

Table IV.3.12

Guam DAWR December 1988
Offshore Creel Survey Expansion Summary

Gear	Catch	CV	Boat Hrs	CV	Boat Cnt	CV	Prsn Hrs	CV	Prsn Cnt	CV	Cpue	CV
Trolling	29758.4	42	4533.5	18	921.6	9	14424.4	20	2915.8	15	6.0	33
Bottom fish	1142.2	65	309.4	61	139.7	62	753.6	60	369.3	66	2.9	62*
Total:	30900.7	42	4842.9	20	980.6	12	15178.0	21	3037.1	16	5.9	32

* Not enough data to properly compute Coefficient of Variation (CV).

Table IV.4.1

Guam DAWR January 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	622.7	4.10	0	0	0	0	622.7	29.76
Needlefish	63.4	0.42	63.4	0.50	0	0	0	0
Squirrelfish	66.4	0.44	0	0	66.4	18.29	0	0
Grouper	48.5	0.32	0	0	48.5	13.37	0	0
Jacks	994.5	6.55	0	0	125.5	34.59	868.9	41.53
Dolphinfish (mahimahi)	8772.2	57.78	8772.2	68.92	0	0	0	0
Snappers	7.0	0.05	0	0	7.0	1.92	0	0
Uku (jobfish)	169.8	1.12	0	0	0	0	169.8	8.12
Blue lined snapper	17.3	0.11	0	0	17.3	4.77	0	0
Sweetlips	73.6	0.48	0	0	0	0	73.6	3.52
Emperors	102.0	0.67	0	0	70.9	19.52	31.1	1.49
Goatfish	17.9	0.12	0	0	17.9	4.92	0	0
Rudderfish	141.5	0.93	0	0	0	0	141.5	6.76
Wrasse	9.5	0.06	0	0	9.5	2.61	0	0
Parrotfish	184.8	1.22	0	0	0	0	184.8	8.83
Wahoo	1098.2	7.23	1098.2	8.63	0	0	0	0
Kawakawa	81.0	0.53	81.0	0.64	0	0	0	0
Skipjack tuna	679.3	4.47	679.3	5.34	0	0	0	0
Yellowfin tuna	513.9	3.38	513.9	4.04	0	0	0	0
Blue marlin	1519.8	10.01	1519.8	11.94	0	0	0	0
Total all species:	15183.2	100.00	12727.7	83.83	363.0	2.39	2092.5	13.78

Table IV.4.2

Guam DAWR February 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear
Grouper	70.7	0.08	0	0	70.7	30.49
Rainbow runner	127.5	0.15	127.5	0.15	0	0
Dolphinfish (mahimahi)	70074.9	81.95	70074.9	82.17	0	0
Uku (jobfish)	62.0	0.07	0	0	62.0	26.73
Blue lined snapper	2.9	0	0	0	2.9	1.25
Emperors	93.4	0.11	0	0	93.4	40.27
Goatfish	2.9	0	0	0	2.9	1.25
Barracuda	818.2	0.96	818.2	0.96	0	0
Wahoo	2954.0	3.45	2954.0	3.46	0	0
Kawakawa	619.8	0.72	619.8	0.73	0	0
Skipjack tuna	4509.0	5.27	4509.0	5.29	0	0
Yellowfin tuna	4597.5	5.38	4597.5	5.39	0	0
Sailfish	974.0	1.14	974.0	1.14	0	0
Shortbill spearfish	602.1	0.70	602.1	0.71	0	0
Total all species:	85509.1	100.00	85277.1	99.73	231.9	0.27

Table IV.4.3

Guam DAWR March 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	1525.9	0.89	1525.9	0.89	0	0	0	0
Squirrelfish	30.5	0.02	0	0	30.5	8.56	0	0
Grouper	55.5	0.03	0	0	55.5	15.61	0	0
Jacks	23.1	0.01	0	0	0	0	23.1	2.64
Rainbow runner	676.6	0.39	676.6	0.40	0	0	0	0
Dolphinfish (mahimahi)	150481.4	87.40	150481.4	88.03	0	0	0	0
Snappers	88.3	0.05	88.3	0.05	0	0	0	0
Uku (jobfish)	83.6	0.05	0	0	83.6	23.49	0	0
Yellowtail kalikali	141.2	0.08	0	0	141.2	39.67	0	0
Emperors	21.1	0.01	0	0	12.6	3.55	8.5	0.97
Rudderfish	26.2	0.02	0	0	0	0	26.2	2.99
Barracuda	201.5	0.12	201.5	0.12	0	0	0	0
Parrotfish	26.9	0.02	0	0	0	0	26.9	3.08
Surgeonfish and tangs	90.1	0.05	0	0	0	0	90.1	10.29
Wahoo	2144.9	1.25	2144.9	1.25	0	0	0	0
Kawakawa	479.9	0.28	479.9	0.28	0	0	0	0
Dogtooth tuna	561.4	0.33	561.4	0.33	0	0	0	0
Skipjack tuna	11178.1	6.49	11178.1	6.54	0	0	0	0
Yellowfin tuna	2165.0	1.26	2165.0	1.27	0	0	0	0
Shortbill spearfish	1439.6	0.84	1439.6	0.84	0	0	0	0
Triggerfish	32.5	0.02	0	0	32.5	9.13	0	0
Mollusks	700.6	0.41	0	0	0	0	700.6	80.04
Total all species:	172173.8	100.00	170942.6	99.28	355.9	0.21	875.3	0.51

Table IV.4.4

Guam DAWR April 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	54.2	0.05	0	0	54.2	0.56	0	0
Squirrelfish	160.2	0.14	0	0	160.2	1.65	0	0
Grouper	1180.5	1.03	0	0	1178.2	12.15	2.3	0.43
Bigeyes	9.4	0.01	0	0	9.4	0.10	0	0
Cardinalfish	14.5	0.01	0	0	14.5	0.15	0	0
Jacks	1445.5	1.27	158.5	0.15	1287.0	13.27	0	0
Rainbow runner	591.7	0.52	481.8	0.46	109.9	1.13	0	0
Dolphinfish (mahimahi)	61425.7	53.79	61425.7	59.08	0	0	0	0
Snappers	216.2	0.19	0	0	216.2	2.23	0	0
Lehi (silvermouth)	137.4	0.12	0	0	137.4	1.42	0	0
Uku (jobfish)	1193.0	1.04	0	0	1193.0	12.30	0	0
Ehu (pink snapper)	258.1	0.23	0	0	258.1	2.66	0	0
Blue lined snapper	75.9	0.07	0	0	75.9	0.78	0	0
Yellowtail kalikali	14.5	0.01	0	0	14.5	0.15	0	0
Opakapaka (pink snap)	126.5	0.11	0	0	126.5	1.30	0	0
Yelloweye opakapaka	54.2	0.05	0	0	54.2	0.56	0	0
Gindai (flower snapper)	326.5	0.29	0	0	326.5	3.37	0	0
Emperors	2454.7	2.15	0	0	2454.7	25.32	0	0
Goatfish	28.0	0.02	0	0	24.6	0.25	3.4	0.65
Barracuda	721.2	0.63	721.2	0.69	0	0	0	0
Wrasse	40.9	0.04	0	0	40.9	0.42	0	0
Parrotfish	16.1	0.01	0	0	0	0	16.1	3.02
Surgeonfish and tangs	23.1	0.02	0	0	23.1	0.24	0	0
Wahoo	14138.0	12.38	14138.0	13.60	0	0	0	0
Kawakawa	416.1	0.36	416.1	0.40	0	0	0	0
Dogtooth tuna	851.9	0.75	851.9	0.82	0	0	0	0
Skipjack tuna	16804.7	14.72	16804.7	16.16	0	0	0	0
Yellowfin tuna	6862.9	6.01	6862.9	6.60	0	0	0	0
Blue marlin	2108.0	1.85	2108.0	2.03	0	0	0	0
Triggerfish	71.6	0.06	0	0	71.6	0.74	0	0
Assorted bottom fish	491.7	0.43	0	0	491.7	5.07	0	0
Shallow bottom fish	1373.8	1.20	0	0	1373.8	14.17	0	0
Assorted reef fish	509.6	0.45	0	0	0	0	509.6	95.90
Total all species:	114196.2	100.00	103968.8	91.04	9696.0	8.49	531.4	0.47

Table IV.4.5

Guam DAWR May 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	173.4	0.21	0	0	173.4	4.72	0	0
Squirrelfish	209.1	0.26	0	0	131.8	3.59	77.3	1.42
Scorpionfish	4.7	0.01	0	0	4.7	0.13	0	0
Grouper	1012.4	1.25	0	0	714.4	19.45	297.9	5.49
Jacks	290.1	0.36	230.1	0.32	0	0	60.1	1.11
Rainbow runner	423.5	0.52	423.5	0.59	0	0	0	0
Dolphinfish (mahimahi)	22053.8	27.24	22053.8	30.69	0	0	0	0
Snappers	177.2	0.22	13.9	0.02	114.5	3.12	48.8	0.90
Lehi (silvermouth)	19.9	0.02	0	0	19.9	0.54	0	0
Uku (jobfish)	206.5	0.26	0	0	206.5	5.62	0	0
Ehu (pink snapper)	6.0	0.01	0	0	6.0	0.16	0	0
Blue lined snapper	165.8	0.20	0	0	121.6	3.31	44.2	0.81
Opakapaka (pink snap)	80.4	0.10	0	0	80.4	2.19	0	0
Yelloweye opakapaka	12.0	0.01	0	0	12.0	0.33	0	0
Kalikali (pink snapper)	28.4	0.04	0	0	28.4	0.77	0	0
Gindai (flower snapper)	33.1	0.04	0	0	33.1	0.90	0	0
Sweetlips	32.1	0.04	0	0	0	0	32.1	0.59
Emperors	1454.7	1.80	0	0	1297.4	35.33	157.3	2.90
Goatfish	412.0	0.51	0	0	144.4	3.93	267.7	4.93
Rudderfish	517.1	0.64	0	0	0	0	517.1	9.53
Barracuda	1463.5	1.81	1343.7	1.87	119.8	3.26	0	0
Wrasse	79.1	0.10	0	0	27.3	0.74	51.9	0.96
Parrotfish	2273.4	2.81	0	0	0	0	2273.4	41.90
Surgeonfish and tangs	1211.7	1.50	0	0	0	0	1211.7	22.34
Rabbitfish	57.2	0.07	0	0	0	0	57.2	1.06
Wahoo	5976.2	7.38	5976.2	8.32	0	0	0	0
Kawakawa	146.4	0.18	146.4	0.20	0	0	0	0
Dogtooth tuna	186.0	0.23	0	0	186.0	5.06	0	0
Skipjack tuna	21149.2	26.12	21149.2	29.43	0	0	0	0
Yellowfin tuna	8214.0	10.14	8214.0	11.43	0	0	0	0
Blue marlin	12318.3	15.21	12318.3	17.14	0	0	0	0
Triggerfish	112.5	0.14	0	0	112.5	3.06	0	0
Tripletooth puffers	31.5	0.04	0	0	31.5	0.86	0	0
Assorted bottom fish	107.2	0.13	0	0	107.2	2.92	0	0
Assorted reef fish	184.3	0.23	0	0	0	0	184.3	3.40
Mollusks	16.0	0.02	0	0	0	0	16.0	0.30
Octopus	70.1	0.09	0	0	0	0	70.1	1.29
Spiny lobsters	46.1	0.06	0	0	0	0	46.1	0.85
Slipper lobsters	12.0	0.01	0	0	0	0	12.0	0.22
Total all species:	80966.7	100.00	71868.9	88.76	3672.6	4.54	5425.1	6.70

Table IV.4.6

Guam DAWR June 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	2309.4	6.22	2309.4	7.32	0	0	0	0
Squirrelfish	81.9	0.22	0	0	29.0	0.75	52.9	3.03
Grouper	781.0	2.10	0	0	768.5	19.95	12.5	0.71
False whiting	6.7	0.02	0	0	6.7	0.17	0	0
Jacks	336.6	0.91	96.0	0.30	163.9	4.25	76.7	4.39
Rainbow runner	906.9	2.44	886.2	2.81	0	0	20.7	1.19
Bigeye scad (akule)	202.3	0.54	0	0	0	0	202.3	11.57
Dolphinfish (mahimahi)	236.4	0.64	236.4	0.75	0	0	0	0
Snappers	207.2	0.56	60.5	0.19	45.5	1.18	101.2	5.79
Lehi (silvermouth)	36.5	0.10	0	0	36.5	0.95	0	0
Uku (jobfish)	213.7	0.58	0	0	213.7	5.55	0	0
Blue lined snapper	61.4	0.17	0	0	61.4	1.59	0	0
Yellowtail kalikali	229.5	0.62	0	0	229.5	5.96	0	0
Yelloweye opakapaka	206.7	0.56	0	0	206.7	5.37	0	0
Gindai (flower snapper)	39.5	0.11	0	0	39.5	1.03	0	0
Emperors	1798.2	4.84	0	0	1798.2	46.68	0	0
Goatfish	113.5	0.31	0	0	98.7	2.56	14.8	0.85
Sweepers	2.3	0.01	0	0	0	0	2.3	0.13
Rudderfish	10.1	0.03	0	0	0	0	10.1	0.58
Hawkfish	1.8	0	0	0	1.8	0.05	0	0
Barracuda	181.8	0.49	181.8	0.58	0	0	0	0
Wrasse	139.7	0.38	0	0	130.7	3.39	9.0	0.51
Parrotfish	87.4	0.24	0	0	0	0	87.4	5.00
Surgeonfish and tangs	198.6	0.53	0	0	0	0	198.6	11.36
Wahoo	4673.3	12.58	4673.3	14.81	0	0	0	0
Kawakawa	29.1	0.08	29.1	0.09	0	0	0	0
Dogtooth tuna	1236.5	3.33	1236.5	3.92	0	0	0	0
Skipjack tuna	9157.4	24.65	9157.4	29.03	0	0	0	0
Yellowfin tuna	4513.3	12.15	4513.3	14.31	0	0	0	0
Blue marlin	8168.2	21.99	8168.2	25.89	0	0	0	0
Triggerfish	21.9	0.06	0	0	21.9	0.57	0	0
Assorted reef fish	959.5	2.58	0	0	0	0	959.5	54.89
Total all species:	37148.5	100.00	31548.1	84.92	3852.3	10.37	1748.1	4.71

Table IV.4.7

Guam DAWR July 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	384.0	0.38	166.8	0.18	217.2	2.75	0	0
Moray eels	778.7	0.77	0	0	0	0	778.7	27.71
Squirrelfish	287.2	0.28	0	0	244.2	3.10	42.9	1.53
Grouper	1354.2	1.34	0	0	1225.9	15.54	128.3	4.56
Bigeyes	27.5	0.03	0	0	27.5	0.35	0	0
False whiting	4.5	0	0	0	4.5	0.06	0	0
Jacks	1450.5	1.43	310.5	0.34	1126.8	14.29	13.2	0.47
Rainbow runner	4435.9	4.38	4167.9	4.60	268.0	3.40	0	0
Dolphinfish (mahimahi)	49.7	0.05	49.7	0.05	0	0	0	0
Snappers	658.7	0.65	0	0	658.7	8.35	0	0
Lehi (silvermouth)	108.6	0.11	0	0	108.6	1.38	0	0
Uku (jobfish)	373.8	0.37	0	0	373.8	4.74	0	0
Ehu (pink snapper)	249.2	0.25	0	0	249.2	3.16	0	0
Onaga (red snapper)	86.3	0.09	0	0	86.3	1.09	0	0
Blue lined snapper	355.6	0.35	0	0	355.6	4.51	0	0
Yellowtail kalikali	527.1	0.52	0	0	527.1	6.68	0	0
Opakapaka (pink snap)	25.6	0.03	0	0	25.6	0.32	0	0
Yelloweye opakapaka	343.7	0.34	0	0	343.7	4.36	0	0
Gindai (flower snapper)	199.7	0.20	0	0	199.7	2.53	0	0
Sweetlips	15.6	0.02	0	0	0	0	15.6	0.55
Emperors	1264.2	1.25	0	0	1196.8	15.17	67.4	2.40
Goatfish	145.2	0.14	0	0	134.5	1.71	10.7	0.38
Rudderfish	14.7	0.01	0	0	0	0	14.7	0.52
Butterflyfish	6.4	0.01	0	0	6.4	0.08	0	0
Barracuda	239.6	0.24	95.8	0.11	143.8	1.82	0	0
Wrasse	46.3	0.05	0	0	46.3	0.59	0	0
Parrotfish	211.8	0.21	0	0	0	0	211.8	7.53
Surgeonfish and tangs	894.7	0.88	0	0	20.8	0.26	874.0	31.10
Rabbitfish	21.0	0.02	0	0	0	0	21.0	0.75
Tunas	14.2	0.01	14.2	0.02	0	0	0	0
Wahoo	4827.0	4.77	4827.0	5.33	0	0	0	0
Kawakawa	1086.1	1.07	1086.1	1.20	0	0	0	0
Dogtooth tuna	958.3	0.95	958.3	1.06	0	0	0	0
Skipjack tuna	38707.9	38.24	38707.9	42.76	0	0	0	0
Yellowfin tuna	19067.8	18.84	18951.7	20.94	116.0	1.47	0	0
Blue marlin	21185.4	20.93	21185.4	23.40	0	0	0	0
Triggerfish	180.2	0.18	0	0	180.2	2.28	0	0
Assorted reef fish	544.4	0.54	0	0	0	0	544.4	19.37
Mollusks	1.0	0	0	0	0	0	1.0	0.04
Spiny lobsters	79.5	0.08	0	0	0	0	79.5	2.83
Slipper lobsters	7.5	0.01	0	0	0	0	7.5	0.27
Total all species:	101218.9	100.00	90521.3	89.43	7887.1	7.79	2810.5	2.78

Table IV.4.8

Guam DAWR August 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	284.2	0.30	0	0	284.2	3.83	0	0
Moray eels	75.9	0.08	0	0	0	0	75.9	1.00
Lizardfish	2.1	0	0	0	2.1	0.03	0	0
Squirrelfish	100.6	0.11	0	0	53.3	0.72	47.3	0.62
Scorpionfish	39.8	0.04	0	0	39.8	0.54	0	0
Grouper	389.6	0.41	0	0	331.5	4.47	58.1	0.77
Flagtails	4.9	0.01	0	0	0	0	4.9	0.06
Jacks	1686.0	1.78	187.4	0.23	1422.8	19.17	75.7	1.00
Rainbow runner	1391.1	1.47	1391.1	1.74	0	0	0	0
Bigeye scad (akule)	176.2	0.19	0	0	0	0	176.2	2.33
Dolphinfish (mahimahi)	125.7	0.13	125.7	0.16	0	0	0	0
Snappers	540.9	0.57	31.1	0.04	459.5	6.19	50.3	0.66
Lehi (silvermouth)	417.0	0.44	0	0	417.0	5.62	0	0
Uku (jobfish)	588.7	0.62	101.3	0.13	435.6	5.87	51.8	0.68
Ehu (pink snapper)	978.2	1.03	0	0	978.2	13.18	0	0
Blue lined snapper	110.2	0.12	0	0	110.2	1.48	0	0
Yellowtail kalikali	308.3	0.32	0	0	308.3	4.15	0	0
Yelloweye opakapaka	95.6	0.10	0	0	95.6	1.29	0	0
Gindai (flower snapper)	608.2	0.64	0	0	608.2	8.19	0	0
Sweetlips	62.4	0.07	0	0	38.5	0.52	23.9	0.32
Emperors	1117.1	1.18	0	0	1117.1	15.05	0	0
Goatfish	62.9	0.07	0	0	13.3	0.18	49.6	0.65
Rudderfish	162.0	0.17	0	0	0	0	162.0	2.14
Butterflyfish	1.8	0	0	0	0	0	1.8	0.02
Angelfish	2.5	0	0	0	0	0	2.5	0.03
Mullet	6.5	0.01	0	0	0	0	6.5	0.09
Barracuda	899.2	0.95	899.2	1.13	0	0	0	0
Wrasse	647.0	0.68	0	0	42.8	0.58	604.3	7.98
Parrotfish	2007.6	2.12	0	0	0	0	2007.6	26.51
Surgeonfish and tangs	1569.8	1.65	0	0	10.1	0.14	1559.7	20.59
Rabbitfish	33.1	0.03	0	0	0	0	33.1	0.44
Wahoo	3276.3	3.45	3276.3	4.10	0	0	0	0
Kawakawa	98.4	0.10	98.4	0.12	0	0	0	0
Dogtooth tuna	1151.8	1.21	577.4	0.72	574.4	7.74	0	0
Skipjack tuna	45488.7	47.93	45488.7	56.92	0	0	0	0
Yellowfin tuna	11237.6	11.84	11237.6	14.06	0	0	0	0
Blue marlin	16500.8	17.39	16500.8	20.65	0	0	0	0
Flounder	2.3	0	0	0	0	0	2.3	0.03
Triggerfish	79.9	0.08	0	0	79.9	1.08	0	0
Assorted reef fish	658.5	0.69	0	0	0	0	658.5	8.70
Mollusks	1522.2	1.60	0	0	0	0	1522.2	20.10
Squid	5.1	0.01	0	0	0	0	5.1	0.07
Octopus	63.9	0.07	0	0	0	0	63.9	0.84
Spiny lobsters	230.7	0.24	0	0	0	0	230.7	3.05
Slipper lobsters	4.2	0	0	0	0	0	4.2	0.06
Crabs	95.3	0.10	0	0	0	0	95.3	1.26
Total all species:	94910.8	100.00	79915.0	84.20	7422.3	7.82	7573.5	7.98

Table IV.4.9

Guam DAWR September 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	7312.3	0.88	3740.4	0.50	2784.6	5.10	787.3	2.24
Moray eels	672.3	0.08	0	0	3.3	0.01	669.0	1.90
Lizardfish	2.7	0	0	0	2.7	0	0	0
Needlefish	155.0	0.02	155.0	0.02	0	0	0	0
Squirrelfish	2240.1	0.27	0	0	1687.0	3.09	553.0	1.57
Scorpionfish	97.1	0.01	0	0	45.0	0.08	52.2	0.15
Grouper	7560.7	0.91	0	0	6719.5	12.30	841.1	2.39
Flagtails	5.6	0	0	0	0	0	5.6	0.02
Bigeyes	96.0	0.01	0	0	90.0	0.16	6.0	0.02
Cardinalfish	13.4	0	0	0	13.4	0.02	0	0
False whiting	12.0	0	0	0	12.0	0.02	0	0
Jacks	8978.1	1.08	1308.5	0.18	5458.4	9.99	2211.1	6.29
Rainbow runner	9491.9	1.14	9049.6	1.22	405.9	0.74	36.4	0.10
Bigeye scad (akule)	5527.2	0.66	0	0	0	0	5527.2	15.71
Dolphinfish (mahimahi)	310154.9	37.19	310154.9	41.68	0	0	0	0
Snappers	3037.8	0.36	187.8	0.03	2484.2	4.55	365.8	1.04
Lehi (silvermouth)	1290.1	0.15	0	0	1290.1	2.36	0	0
Uku (jobfish)	3735.6	0.45	100.3	0.01	3371.2	6.17	264.1	0.75
Ehu (pink snapper)	2070.3	0.25	0	0	2070.3	3.79	0	0
Onaga (red snapper)	742.2	0.09	0	0	742.2	1.36	0	0
Blue lined snapper	1282.5	0.15	0	0	1240.9	2.27	41.5	0.12
Yellowtail kalikali	1748.1	0.21	0	0	1748.1	3.20	0	0
Opakapaka (pink snap)	309.2	0.04	0	0	309.2	0.57	0	0
Yelloweye opakapaka	1023.3	0.12	0	0	1023.3	1.87	0	0
Kalikali (pink snapper)	30.1	0	0	0	30.1	0.06	0	0
Gindai (flower snapper)	1729.4	0.21	0	0	1729.4	3.16	0	0
Sweetlips	317.7	0.04	0	0	35.9	0.07	281.7	0.80
Emperors	12730.3	1.53	0	0	12388.4	22.67	341.9	0.97
Goatfish	1064.6	0.13	0	0	630.9	1.15	433.7	1.23
Sweepers	10.0	0	0	0	5.0	0.01	4.9	0.01
Rudderfish	1288.0	0.15	0	0	0	0	1288.0	3.66
Butterflyfish	9.2	0	0	0	6.7	0.01	2.5	0.01
Angelfish	3.6	0	0	0	0	0	3.6	0.01
Hawkfish	5.7	0	0	0	5.7	0.01	0	0
Mullet	7.5	0	0	0	0	0	7.5	0.02
Barracuda	5999.9	0.72	5722.4	0.77	277.5	0.51	0	0
Wrasse	1759.0	0.21	0	0	401.2	0.73	1357.8	3.86
Parrotfish	7798.9	0.94	0	0	0	0	7798.9	22.17
Surgeonfish and tangs	6141.5	0.74	0	0	1213.9	2.22	4927.6	14.01
Rabbitfish	131.5	0.02	0	0	0	0	131.5	0.37
Tunas	16.3	0	16.3	0	0	0	0	0
Wahoo	93435.5	11.20	93435.5	12.56	0	0	0	0
Kawakawa	3577.0	0.43	3577.0	0.48	0	0	0	0
Dogtooth tuna	6100.2	0.73	5177.7	0.70	922.6	1.69	0	0
Skipjack tuna	173637.0	20.82	173637.0	23.33	0	0	0	0
Yellowfin tuna	73126.0	8.77	73003.3	9.81	122.6	0.22	0	0
Sailfish	3181.4	0.38	3181.4	0.43	0	0	0	0
Blue marlin	59528.0	7.14	59528.0	8.00	0	0	0	0
Shortbill spearfish	2178.0	0.26	2178.0	0.29	0	0	0	0
Flounder	2.6	0	0	0	0	0	2.6	0.01
Triggerfish	669.3	0.08	0	0	669.3	1.22	0	0
Tripletooth puffers	33.4	0	0	0	33.4	0.06	0	0
Assorted bottom fish	568.3	0.07	0	0	568.3	1.04	0	0
Shallow bottom fish	1686.6	0.20	0	0	1686.6	3.09	0	0
Deep bottom fish	2413.7	0.29	0	0	2413.7	4.42	0	0
Assorted reef fish	3762.7	0.45	0	0	0	0	3762.7	10.70
Mollusks	2380.1	0.29	0	0	0	0	2380.1	6.77
Squid	7.2	0	0	0	0	0	7.2	0.02
Octopus	183.9	0.02	0	0	0	0	183.9	0.52

Table IV.4.9 (cont.)

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Spiny lobsters	719.8	0.09	0	0	0	0	719.8	2.05
Slipper lobsters	47.7	0.01	0	0	0	0	47.7	0.14
Crabs	134.9	0.02	0	0	0	0	134.9	0.38
Total all species:	833974.8	100.00	744153.3	89.23	54642.6	6.55	35179.0	4.22

Table IV.4.10

Guam DAWR October 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Sharks	580.2	1.57	204.9	1.07	375.3	6.07	0	0
Conger eels	292.7	0.79	0	0	292.7	4.73	0	0
Lizardfish	22.5	0.06	0	0	22.5	0.36	0	0
Bearfish	31.3	0.08	0	0	31.3	0.51	0	0
Squirrelfish	62.8	0.17	0	0	62.8	1.02	0	0
Scorpionfish	7.0	0.02	0	0	7.0	0.11	0	0
Grouper	663.8	1.80	0	0	663.8	10.73	0	0
False whiting	1.8	0	0	0	1.8	0.03	0	0
Jacks	1005.7	2.73	0	0	709.8	11.47	295.9	2.57
Rainbow runner	273.2	0.74	273.2	1.43	0	0	0	0
Bigeye scad (akule)	10758.1	29.18	0	0	0	0	10758.1	93.41
Dolphinfish (mahimahi)	614.8	1.67	614.8	3.21	0	0	0	0
Pomfret	170.1	0.46	0	0	170.1	2.75	0	0
Snappers	36.0	0.10	0	0	36.0	0.58	0	0
Lehi (silvermouth)	745.6	2.02	0	0	745.6	12.05	0	0
Uku (jobfish)	361.3	0.98	0	0	260.2	4.21	101.1	0.88
Ehu (pink snapper)	281.5	0.76	0	0	281.5	4.55	0	0
Onaga (red snapper)	650.5	1.76	0	0	650.5	10.51	0	0
Blue lined snapper	134.1	0.36	0	0	134.1	2.17	0	0
Yellowtail kalikali	39.3	0.11	0	0	39.3	0.63	0	0
Kalikali (pink snapper)	30.0	0.08	0	0	30.0	0.49	0	0
Gindai (flower snapper)	187.4	0.51	0	0	187.4	3.03	0	0
Emperors	1130.9	3.07	0	0	1130.9	18.28	0	0
Goatfish	60.8	0.16	0	0	60.8	0.98	0	0
Rudderfish	89.4	0.24	0	0	0	0	89.4	0.78
Barracuda	347.7	0.94	245.1	1.28	102.6	1.66	0	0
Wrasse	17.0	0.05	0	0	17.0	0.28	0	0
Parrotfish	213.8	0.58	0	0	0	0	213.8	1.86
Surgeonfish and tangs	95.8	0.26	0	0	37.5	0.61	58.3	0.51
Wahoo	7413.7	20.11	7413.7	38.68	0	0	0	0
Kawakawa	92.4	0.25	92.4	0.48	0	0	0	0
Dogtooth tuna	209.0	0.57	209.0	1.09	0	0	0	0
Skipjack tuna	8231.3	22.33	8231.3	42.95	0	0	0	0
Yellowfin tuna	434.0	1.18	434.0	2.26	0	0	0	0
Blue marlin	1446.6	3.92	1446.6	7.55	0	0	0	0
Triggerfish	136.1	0.37	0	0	136.1	2.20	0	0
Total all species:	36868.2	100.00	19165.0	51.98	6186.5	16.78	11516.6	31.24

Table IV.4.11

Guam DAWR November 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear	other	% this gear
Rays	1658.3	3.53	0	0	1658.3	36.60	0	0
Needlefish	52.7	0.11	52.7	0.13	0	0	0	0
Squirrelfish	54.7	0.12	0	0	11.1	0.24	43.6	3.44
Grouper	869.5	1.85	0	0	773.1	17.06	96.5	7.60
Jacks	88.4	0.19	0	0	65.5	1.45	22.9	1.80
Rainbow runner	291.9	0.62	291.9	0.71	0	0	0	0
Dolphinfish (mahimahi)	2737.0	5.83	2737.0	6.65	0	0	0	0
Snappers	558.8	1.19	0	0	540.1	11.92	18.7	1.47
Uku (jobfish)	320.1	0.68	0	0	320.1	7.06	0	0
Blue lined snapper	83.6	0.18	0	0	83.6	1.84	0	0
Yellowtail kalikali	9.6	0.02	0	0	9.6	0.21	0	0
Sweetlips	27.5	0.06	0	0	0	0	27.5	2.17
Emperors	636.3	1.35	0	0	636.3	14.04	0	0
Goatfish	92.5	0.20	0	0	92.5	2.04	0	0
Barracuda	99.5	0.21	0	0	99.5	2.20	0	0
Wrasse	101.2	0.22	0	0	79.2	1.75	22.1	1.74
Parrotfish	709.1	1.51	0	0	0	0	709.1	55.90
Surgeonfish and tangs	84.8	0.18	0	0	0	0	84.8	6.68
Wahoo	31891.4	67.90	31891.4	77.47	0	0	0	0
Kawakawa	20.3	0.04	20.3	0.05	0	0	0	0
Dogtooth tuna	648.3	1.38	509.4	1.24	138.9	3.07	0	0
Skipjack tuna	2724.9	5.80	2724.9	6.62	0	0	0	0
Yellowfin tuna	2939.8	6.26	2939.8	7.14	0	0	0	0
Triggerfish	23.5	0.05	0	0	23.5	0.52	0	0
Assorted reef fish	176.0	0.37	0	0	0	0	176.0	13.87
Spiny lobsters	61.0	0.13	0	0	0	0	61.0	4.81
Slipper lobsters	6.5	0.01	0	0	0	0	6.5	0.52
Total all species:	46967.0	100.00	41167.3	87.65	4531.2	9.65	1268.5	2.70

Table IV.4.12

Guam DAWR December 1988
Offshore Creel Survey Species Composition

Common Name	Total all gears	% all gears	trolling	% this gear	bottom	% this gear
Squirrelfish	3.6	0.01	0	0	3.6	0.31
Grouper	173.6	0.56	0	0	173.6	15.20
False whiting	15.2	0.05	0	0	15.2	1.33
Jacks	91.4	0.30	0	0	91.4	8.00
Rainbow runner	1526.6	4.94	1526.6	5.13	0	0
Dolphinfish (mahimahi)	872.3	2.82	872.3	2.93	0	0
Snappers	57.4	0.19	0	0	57.4	5.02
Uku (jobfish)	223.4	0.72	0	0	223.4	19.56
Blue lined snapper	10.2	0.03	0	0	10.2	0.89
Emperors	486.3	1.57	0	0	486.3	42.58
Goatfish	40.6	0.13	0	0	40.6	3.56
Barracuda	981.4	3.18	981.4	3.30	0	0
Wrasse	40.6	0.13	0	0	40.6	3.56
Wahoo	15499.7	50.16	15499.7	52.09	0	0
Kawakawa	140.2	0.45	140.2	0.47	0	0
Skipjack tuna	3546.5	11.48	3546.5	11.92	0	0
Yellowfin tuna	4855.0	15.71	4855.0	16.31	0	0
Blue marlin	2336.6	7.56	2336.6	7.85	0	0
Total all species:	30900.7	100.00	29758.4	96.30	1142.2	3.70

Table IV.5.1

1988 Marianas Fishing Derby
Summary Reports

Prepared by
Guam Division of Aquatic & Wildlife Resources

Derby Totals

	Day 1 Aug 19	Day 2 Aug 20	Day 3 Aug 21	Derby Totals
Number of boats	95.0	96.0	72.0	263.0
Number of fishermen	292.0	311.0	230.0	833.0
Ave. Men per boat	3.1	3.2	3.2	3.2
Number of lines fished	432.0	412.0	298.0	1142.0
Ave. Lines per boat	4.5	4.3	4.1	4.3
Boat hours	894.0	818.9	571.7	2275.0
Fished hours	862.6	774.7	519.1	2161.9
Avg. Boat trip length	9.4	8.5	7.9	8.7
Avg. Time spent fishing	9.1	8.1	7.2	8.2
Fisherman hours	2747.7	2652.8	1826.2	7205.5
Line hours	3922.6	3324.8	2148.6	9387.2
Number of fish landed	579.0	280.0	134.0	993.0
Pounds landed*	8838.5	6272.7	2940.9	18052.1
Ave catch per boat day	93.0	65.3	40.8	68.6
Ave catch per boat hour	9.9	7.6	5.1	7.9
Ave catch per man hour	3.2	2.4	1.6	2.5
Ave catch per line hour	2.2	1.9	1.4	1.9

SPECIES TOTALS

	DAY 1 - AUG 19			DAY 2 - AUG 20			DAY 3 - AUG 21			TOTAL		
SPECIES	NUMBER CAUGHT	TOTAL WT-LBS	AVE WT.	NUMBER CAUGHT	TOTAL WT-LBS	AVE WT.	NUMBER CAUGHT	TOTAL WT-LBS	AVE WT.	NUMBER CAUGHT	TOTAL WT-LBS	AVE WT.
MARLIN	23	3323.0	144.5	24	3454.2	143.9	11	1671.1	151.9	58	8448.0	145.7
YELLOWFIN TUNA	114	1345.2	11.8	28	315.3	11.3	19	210.3	11.1	161	1870.6	11.6
WAHOO	32	595.2	18.6	25	386.7	15.5	15	269.0	17.9	72	1250.7	17.4
MAHIMAHI	3	9.9	3.3	1	9.5	9.5	1	7.5	7.5	5	26.9	5.4
SKIPJACK TUNA	347	3278.2	9.4	162	1863.3	11.5	75	729.9	9.7	584	5871.7	10.1
RAINBOW RUNNER	40	164.9	4.1	17	60.6	3.6	6	19.4	3.2	63	244.9	3.9
BARRACUDA	9	85.8	9.5	17	163.6	9.6	3	22.5	7.5	29	271.8	9.4
KAWAKAWA	8	11.2	1.4	3	1.5	0.5	4	11.5	2.9	15	24.3	1.6
DOGTOOTH TUNA	3	25.1	8.4	3	18.1	6.0	0	0	0	6	43.2	7.2
TOTALS	579	8838.5	15.3	280	6272.7	22.4	134	2940.9	21.9	993	18052.1	18.2

* Includes incidental catch.

Table IV.6.1

Guam DAWR Annual 1988
Day Inshore Creel Survey
Expansion Summary

Methods	Prsn Cnt	CV	Gear Cnt	CV	Trip Cnt	CV	Prns Hrs	CV	Gear Hrs	CV	Catch	CV	Cpue
Hook & line	15577.0	11	15586.5	11	11564.9	14	66470.1	11	66618.7	11	22474.1	5	.34
Cast net	5978.6	12	5602.6	12	5521.7	12	17688.9	12	16585.3	12	31674.0	12	1.91
Gill net	6414.8	11	3258.5	11	2903.6	12	26936.9	13	13714.9	13	58213.9	13	4.24
Surround net	1583.0	25	312.3	25	312.3	25	7603.1	25	1472.5	25	6619.3	25	4.50
Spear-snorkel	902.5	24	851.3	24	515.3	24	2797.8	24	2645.9	24	16823.1	24	6.36
Spear-scuba	0	0	0	0	0	0	0	0	0	0	0	0	0
hook & gaff	1152.3	33	2087.6	33	804.3	34	2316.8	39	4452.3	40	4262.0	40	.96
Drag net	0	0	0	0	0	0	0	0	0	0	0	0	2.12
Other	356.1	56	356.1	56	272.7	69	1891.5	52	1891.5	52	24516.2	52	12.96
Totals	31964.3	7	28055.0	7	21554.7	7	124898.9	7	111223.6	7	164582.6	7	3.05

Table IV.6.2

Guam DAWR Annual 1988
Night Inshore Creel Survey
Expansion Summary

Methods	Prsn Cnt	CV	Gear Cnt	CV	Trip Cnt	CV	Prns Hrs	CV	Gear Hrs	CV	Catch	CV	Cpue
Hook & line	6442.9	11	6605.9	11	4371.2	17	16295.8	11	16737.2	11	2999.0	5	.18
Cast net	63.2	66	60.4	69	55.5	72	158.9	75	122.6	65	52.3	65	.43
Gill net	3694.5	9	1448.2	9	1448.2	9	18488.9	9	7296.2	9	24775.2	9	3.40
Surround net	64.2	100	21.4	100	21.4	100	64.2	100	21.4	100	47.2	100	2.20
Spear-snorkel	4643.0	26	4335.8	25	1872.7	26	13583.9	25	12688.9	25	26461.1	25	2.09
Spear-scuba	786.5	34	777.5	34	308.3	33	7438.6	38	7420.7	38	5725.9	38	.77
Hook & gaff	31.3	82	52.2	82	14.9	82	284.2	82	473.6	82	261.0	82	.55
Drag net	223.7	93	428.0	93	428.0	93	581.7	93	1112.9	93	12664.0	93	11.38
Other	1112.8	40	1112.8	40	559.2	40	7467.1	40	7467.1	40	23869.9	40	3.20
Totals	17062.2	11	14842.3	10	8771.2	10	54604.8	10	45897.1	10	96855.5	10	2.07

Table IV.7.1

Guam DAWR 1988 Annual
Day Inshore Creel Survey
Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Rays	665.7	0.40	Herring	24516.2	14.90
Milkfish	444.9	0.27	Lizardfish	32.4	0.02
Needlefish	23.9	0.01	Halfbeak	1414.4	0.86
Squirrelfish	1523.6	0.93	Scorpionfish	75.7	0.05
Grouper	309.6	0.19	Cardinalfish	6362.8	3.87
Jacks	14822.0	9.01	Bigeye scad (akule)	282.9	0.17
Ponyfishes	574.7	0.35	Snappers	4831.9	2.94
Bream	49.9	0.03	Moharra	7393.6	4.49
Sweetlips	2044.6	1.24	Emperors	9503.8	5.77
Goatfish	17752.0	10.79	Rudderfish	15159.4	9.21
Butterflyfish	21.1	0.01	Damselfishes	391.1	0.24
Mullet	10034.9	6.10	Barracuda	27.7	0.02
Wrasse	809.7	0.49	Parrotfish	209.3	0.13
Surgeonfish and tangs	29271.0	17.79	Moorish idols	319.0	0.19
Rabbitfish	9988.7	6.07	Flounder	58.2	0.04
Triggerfish	1289.9	0.78	Filefish	150.3	0.09
Octopus	4227.5	2.57			
Total all species:	164582.6	100.00			

Table IV.7.2

Guam DAWR 1988 Annual
Night Inshore Creel Survey
Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Herring	7.5	0.01	Milkfish	667.0	0.92
Needlefish	261.9	0.36	Squirrelfish	1173.2	1.62
Scorpionfish	74.4	0.10	Grouper	5883.5	8.10
Jacks	5280.6	7.27	Snappers	1589.1	2.19
Bream	671.6	0.92	Moharra	1243.6	1.71
Sweetlips	21.7	0.03	Emperors	6269.7	8.63
Goatfish	6811.6	9.38	Rudderfish	1905.9	2.62
Damselfishes	44.1	0.06	Mullet	9209.0	12.68
Barracuda	445.9	0.61	Wrasse	572.6	0.79
Parrotfish	1000.5	1.38	Surgeonfish and tangs	22544.4	31.05
Rabbitfish	6725.0	9.26	Flounder	177.0	0.24
Triggerfish	16.5	0.02	Octopus	1.9	0
Total all species:	96855.5	100.00			

Table IV.7.3

Guam DAWR 1988 Annual
Combined Day And Night Inshore Creel Survey
Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Rays	665.7	0.23	Herring	24523.7	8.58
Milkfish	1111.9	0.39	Lizardfish	32.4	0.01
Needlefish	285.8	0.10	Halfbeak	1414.4	0.50
Squirrelfish	2696.7	0.94	Scorpionfish	150.2	0.05
Grouper	6193.1	2.17	Bigeyes	13.5	0
Cardinalfish	6362.8	2.23	Jacks	20102.6	7.04
Bigeye scad (akule)	282.9	0.10	Ponyfishes	574.7	0.20
Snappers	6421.0	2.25	Fusilier	131.6	0.05
Bream	721.5	0.25	Moharra	8637.2	3.02
Sweetlips	2066.3	0.72	Emperors	15773.5	5.52
Goatfish	24563.6	8.60	Rudderfish	17065.3	5.97
Butterflyfish	21.1	0.01	Damselfishes	435.2	0.15
Mullet	19243.9	6.74	Barracuda	473.6	0.17
Wrasse	1382.3	0.48	Parrotfish	1209.8	0.42
Surgeonfish and tangs	51815.4	18.14	Moorish idols	319.0	0.11
Rabbitfish	16713.7	5.85	Flounder	235.3	0.08
Triggerfish	1306.4	0.46	Filefish	150.3	0.05
Unidentified fish	48356.1	16.93	Octopus	4229.5	1.48
Total all species:	261438.2	100.00			

Table IV.7.4

Guam DAWR 1988 Annual
Combined Offshore And Inshore Creel Survey
Species Composition

Common Name	Total Pounds	% SP. Comp.	Common Name	Total Pounds	% SP. Comp.
Sharks	6325.5	0.56	Rays	2250.3	0.20
Herring	24523.7	2.18	Moray eels	637.0	0.06
Conger eels	370.8	0.03	Milkfish	1111.9	0.10
Lizardfish	63.4	0.01	Bearfish	39.6	0
Needlefish	414.8	0.04	Halfbeak	1414.4	0.13
Squirrelfish	4413.6	0.39	Scorpionfish	261.2	0.02
Grouper	13488.9	1.20	Flagtails	5.8	0
Bigeyes	54.2	0	Cardinalfish	6375.5	0.57
False whiting	23.1	0	Jacks	28469.4	2.53
Rainbow runner	11200.2	0.99	Bigeye scad (akule)	13259.0	1.18
Dolphinfish (mahimahi)	310032.1	27.51	Ponyfishes	574.7	0.05
Pomfret	215.5	0.02	Snappers	9371.5	0.83
Lehi (silvermouth)	1728.2	0.15	Uku (jobfish)	4023.2	0.36
Ehu (pink snapper)	2108.2	0.19	Onaga (red snapper)	1147.3	0.10
Blue lined snapper	1164.2	0.10	Yellowtail kalikali	1442.7	0.13
Opakapaka (pink snap)	264.6	0.02	Yelloweye opakapaka	730.2	0.06
Kalikali (pink snapper)	66.6	0.01	Gindai (flower snapper)	1667.7	0.15
Fusilier	65.8	0.01	Bream	721.5	0.06
Moharra	8637.2	0.77	Sweetlips	2321.2	0.21
Emperors	27855.8	2.47	Goatfish	25651.4	2.28
Sweepers	4.9	0	Rudderfish	18039.5	1.60
Butterflyfish	23.5	0	Angelfish	3.5	0
Damselfishes	435.2	0.04	Hawkfish	1.9	0
Mullet	19251.7	1.71	Barracuda	6088.6	0.54
Wrasse	3031.7	0.27	Parrotfish	8122.1	0.72
Surgeonfish and tangs	56553.6	5.02	Moorish idols	319.0	0.03
Rabbitfish	16839.8	1.49	Tunas	16.7	0
Wahoo	99801.1	8.86	Kawakawa	3497.0	0.31
Dogtooth tuna	5963.8	0.53	Skipjack tuna	184837.7	16.40
Yellowfin tuna	77433.5	6.87	Sailfish	1145.1	0.10
Blue marlin	68510.9	6.08	Shortbill spearfish	1957.0	0.17
Flounder	238.0	0.02	Triggerfish	2044.9	0.18
Filefish	150.3	0.01	Tripletooth puffers	31.7	0
Assorted bottom fish	538.8	0.05	Shallow bottom fish	1362.8	0.12
Deep bottom fish	735.3	0.07	Assorted reef fish	3654.2	0.32
Unidentified fish	24178.1	2.15	Mollusks	2356.6	0.21
Squid	7.0	0	Octopus	4401.7	0.39
Spiny lobsters	776.8	0.07	Slipper lobsters	53.8	0
Crabs	131.8	0.01			
Total all species:	1127031.5	100.00			

Figure IV.5.1

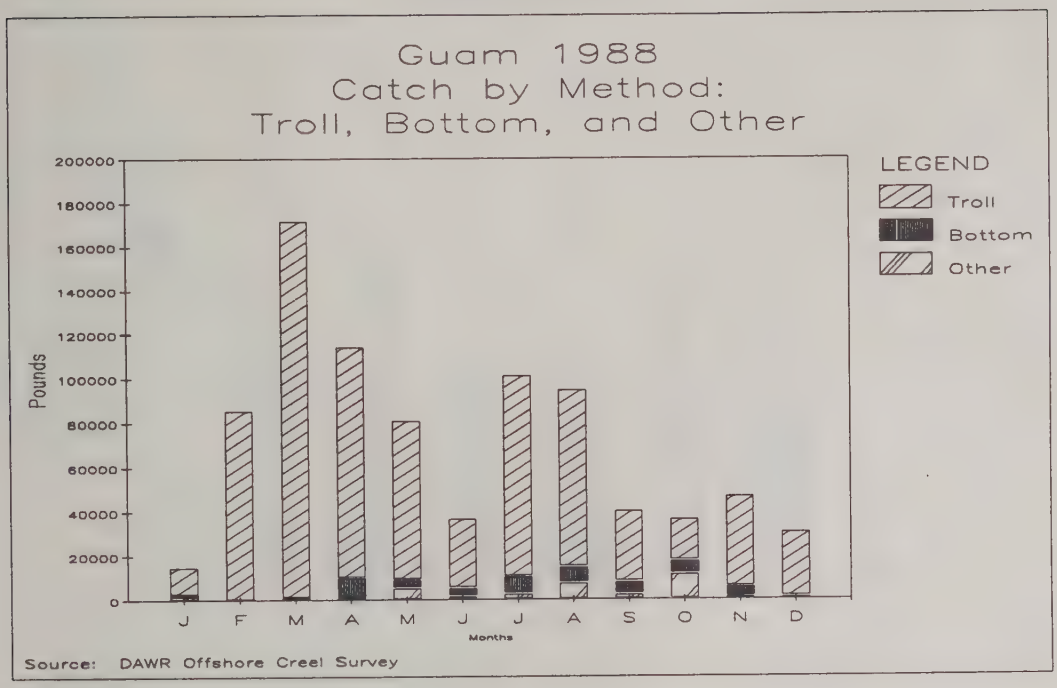


Figure IV.5.2

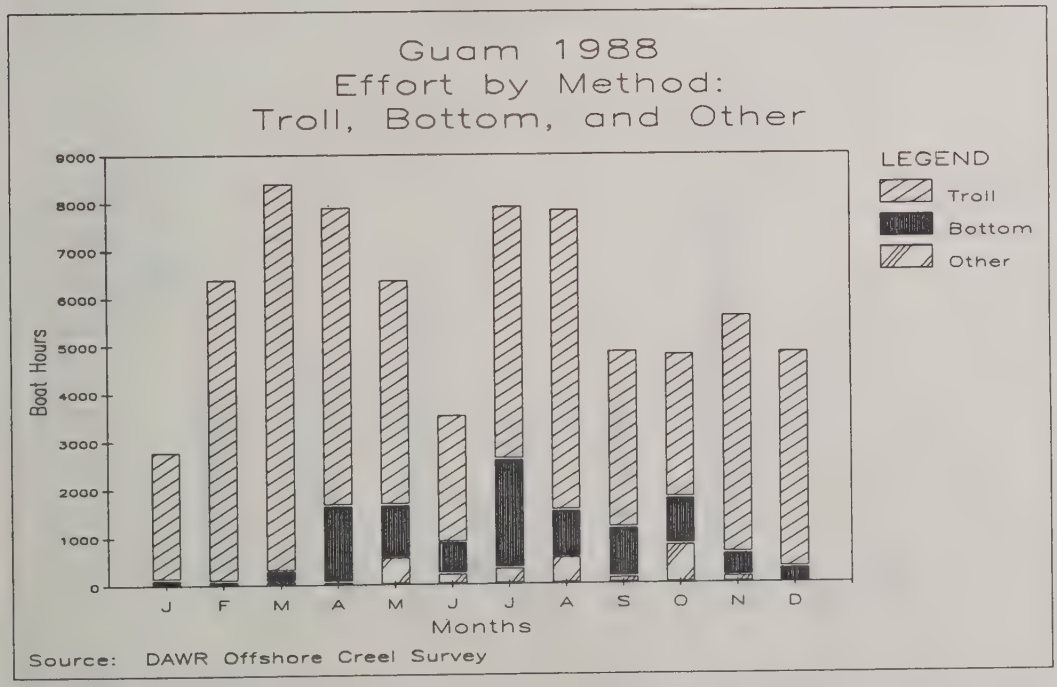
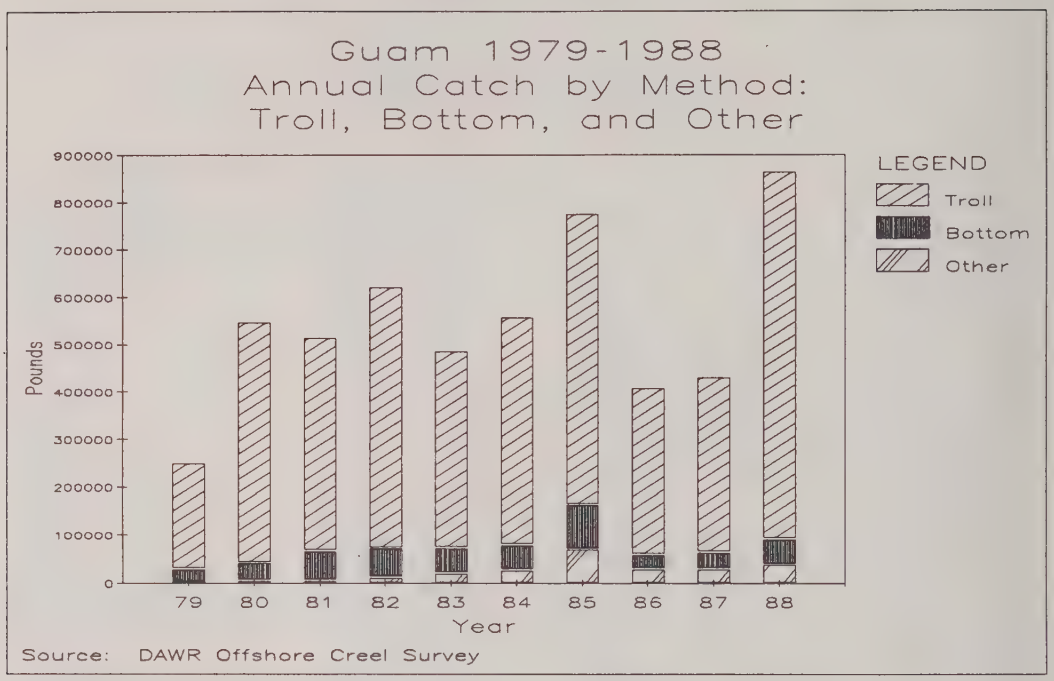


Figure IV.6.1



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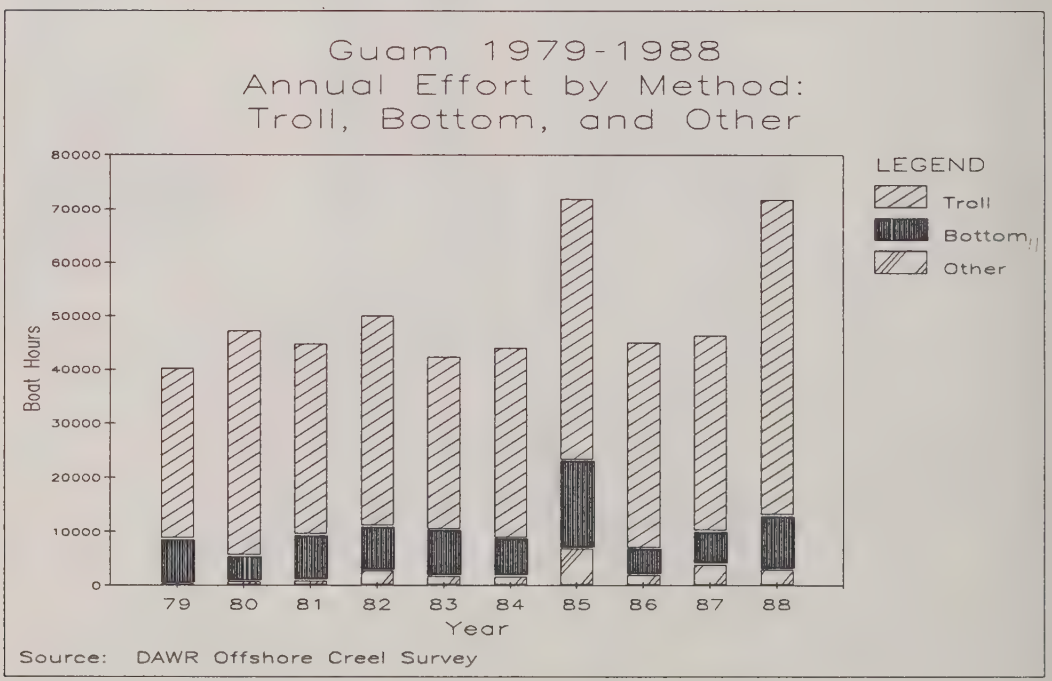

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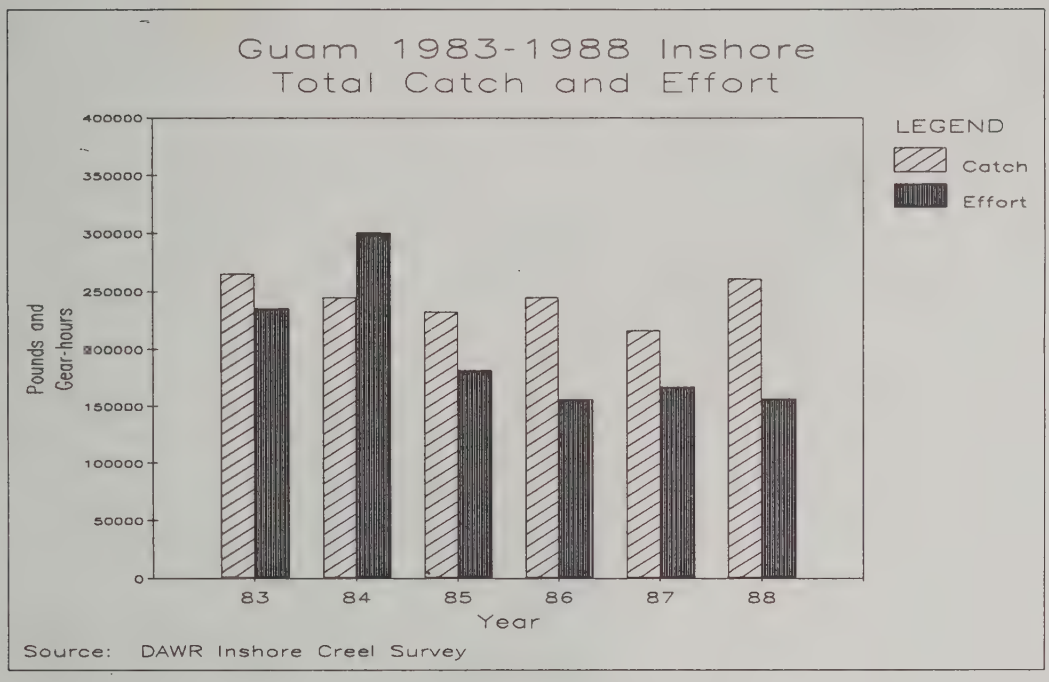
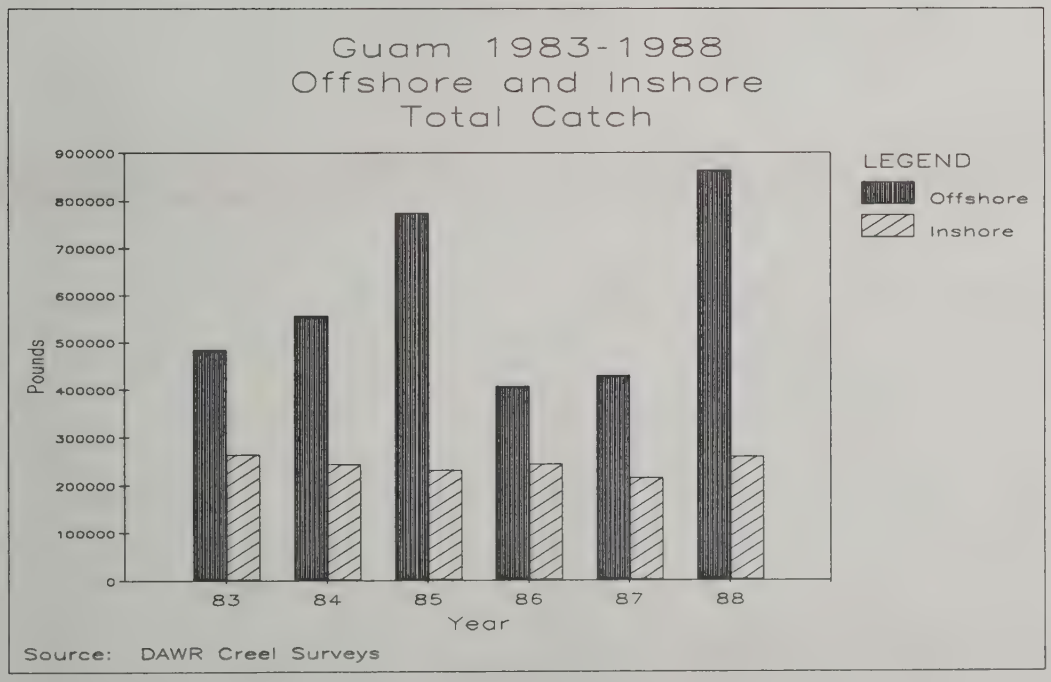


Figure IV.7.2



State of Hawaii

Fishery Statistics
1988

STATE OF HAWAII 1988 FISHERY STATISTICS

Compiled by

Division of Aquatic Resources

and the

Western Pacific Fishery Information Network

May 1990

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STATE OF HAWAII 1988 FISHERY STATISTICS

INTRODUCTION

The Hawaiian Archipelago stretches northwestward over 1,500 miles, from about lat. 19° N and long. 155° W to about lat. 28° N and long. 178° W. The seven main Hawaiian Islands--Hawaii, Maui, Lanai, Molokai, Oahu, Kauai, and Niihau--comprise over 99% of the total land area and have virtually all of the State's population of approximately 1 million residents. Over half of the State's commercial fish catch is landed on Oahu and about a third on Hawaii. The Department of Land and Natural Resources' Division of Aquatic Resources (DAR) has been collecting statistics on the commercial fisheries of Hawaii for over 40 years.

The fisheries of the State of Hawaii are quite diverse and vary from hand harvesting algae to large vessel fisheries, such as longlining and lobster fishing. The major fisheries include tuna fishing using several methods, lobster trapping, hook-and-line bottom fishing for the grouper-snapper-jack complex, net fishing for such species as the bigeye scad, and trolling for such pelagic species as marlin, wahoo, and mahimahi. Of the approximately 15,000 vessels in Hawaii, about 80% are pleasure boats, 10% commercial fishing or charter boats, and the remainder are registered in other categories. The pleasure category includes boats used for recreational, subsistence, and part-time commercial fishing as well as boats not typically used for fishing such as sailboats. To fish commercially (i.e., sell catches or provide charter fishing services) in Hawaii requires purchase of a commercial marine fishing license. There are currently about 2,500 licensed commercial fishermen in the State. Substantial subsistence and recreational fisheries, which are primarily small boat, one-day fisheries, also exist. Data provided in this document are from licensed commercial fishermen only.

DATA COLLECTING SYSTEM

The major data collecting system used by DAR is based on a State law that requires commercial fishermen to report their catches on a monthly basis. Several different data collection forms are used because of the diversity of fishing methods and a desire to obtain specific information on some of these methods. The vast majority of commercial fishermen use the standard C-3 Fish Catch Report, which is submitted each month and requires the following information for each trip taken:

Fisherman's name and commercial license number
Boat's name and its registration number
Date
Area or buoy fished

Type of gear used
Species caught
Number caught
Pounds caught
Pounds sold
Value of sales
Port of landing

The other forms used to report commercial catches are for specific fisheries including the C-4 Aku Catch Report for the pole-and-line or bait-boat fishery for skipjack tuna, the C-5 Flagline Catch Report for the longline fishery for tunas and other pelagic species, and the Pond Operator's Monthly Fish Report for operators of saltwater fish ponds. All of the forms request basic catch and revenue information by species, plus additional fishery-specific information such as effort and bait.

Commercial collectors of tropical marine fish are required to have an aquarium permit in addition to their commercial marine license and are required to report monthly on the C-6 Aquarium Fish Catch Report. However, the aquarium fish catch is not included in the statistics provided in this document.

Some of the advantages of a mandatory fisherman-reporting system are its relative efficiency, low cost, the potential for excellent percent coverage, and the amount of information that can be collected directly from the fishermen. The major disadvantage is that it places the responsibility for accurate data recording and timely data submission on the fishermen. The assumption is made, therefore, that the data submitted by the fishermen are complete and accurate. The DAR recently made several improvements to the system and is continuing its efforts to improve the quality of data and decrease the time delays in receiving and processing the data. No real measurement is available for what percent of the total commercial catch is actually reported to DAR, but estimates have ranged from about 10% to over 99%, depending on the species and fishery. The overall percent coverage was probably over 50% in 1988.

DATA PROCESSING SYSTEM

When the various data reporting forms are received by DAR, they undergo a series of coding and editing procedures before being sent to the State's central data processing staff for keypunching. The use of central data processing staff instead of in-house fisheries personnel to accomplish most of the computer processing activities is a major and significant difference between the processing system in Hawaii and those in American Samoa, Guam, and the Commonwealth of the Northern Mariana Islands. Forms that fail the initial editing by DAR staff are returned to the fishermen for correction and resubmission. Notices are sent to fishermen who fall more than a few months behind in the submission of their reports. Once

the data are keypunched, computer generated reports are used by DAR staff to verify and correct errors in the data base. When the data base is considered to be reasonably complete and error free, it is ready for production of a variety of summary catch reports.

Since this system is based on submission of data from fishermen, late reporting has always been a problem. The DAR has tried to include as much information as possible in its published monthly and annual reports. Before about 1982, statistics from fishermen's reports received after the generation of the computerized monthly summary reports were hand tallied and added to the final version of the reports before they were published. However, because of processing restrictions or complications, the original data bases were not updated. Since 1982, additional editing and data correction procedures were implemented, making data base updates possible. The DAR has made significant progress recently in reducing late reporting by fishermen and the time lag before data are available. Data presented in this report series for 1979-86 were based on published monthly DAR reports and differ from final annual data base total by some small percent (refer to Volumes I and III for details). Beginning with 1987, data were processed directly from the final annual detail data bases from DAR.

DATA REPORTING SYSTEM

Recorded in DAR's monthly landings reports are more than 150 marine species and species groups, many of which are insignificant in the total catch. To help reduce the volume of this document and improve the usability of the tables, WPACFIN staff combined some of the less important species, reorganized the order of presentation, created a new species coding system, and translated all records in the data base. The new coding system has 100 species and species groups based on flexible ecological and phylogenetic criteria. All of the commercially important pelagic and bottom fish species or unique species groups have individual codes and are reported separately. Marine pond catches are included in the species totals, but are less than 0.4% of the total landings for each year.

The monthly and annual reports included in this document contain the common name, weight in pounds, value rounded to the nearest dollar, and the average price per pound for each species. Also included are separate annual reports for commercial fishermen's landings that were not sold. Each monthly report contains a subtotal for the sum of all species for that month, and the December report contains the December subtotal and the annual total. Annual reports contain the total landings for each species and the total recorded landings for all species combined for the calendar year.

Four graphs of monthly landings are presented for 1988, and 26 trend and seasonality graphs, based on 1979-88 data, are also provided. The following species, species groups, and abbreviations are used in the tables and graphs of Hawaii's fishery statistics:

I. Pelagic Management Unit Species (PMUS)

Dolphin (mahimahi)
Wahoo
Blue marlin
Black marlin
Striped marlin
Shortbill spearfish
Sailfish
Swordfish
Sharks

II. Bottomfish Management Unit Species (BMUS)

Deep water jacks (unclassified)
Amberjack
Pig-lipped ulua (jack)
White ulua
Giant sea bass
Bluelined snapper
Ehu (red snapper)
Gindai (flower snapper)
Kalikali (pink snapper)
Lehi (silverjaw snapper)
Onaga (red or long tailed snapper)
Opakapaka (pink snapper)
Uku (gray snapper)

III. Billfish

Billfish (unclassified)
Blue marlin
Black marlin
Striped marlin
Shortbill spearfish
Sailfish
Swordfish

IV. Tunas

Tunas (unclassified)
Skipjack tuna
Yellowfin tuna
Albacore
Bigeye tuna
Kawakawa
Dogtooth tuna

V. Other Tunas

All of the previous tunas excluding skipjack and yellowfin tuna

VI. Fisheries Categories

A. Pelagics

All PMUS and tuna species plus the following:
- Rainbow runner
- Barracuda
- Japanese mackerel
- Frigate tuna
- Ocean sunfish
- Ocean moonfish

B. Bottom Fish

All BMUS plus the following:
- Blue crevally
- Dobe ulua (jack)
- Paapaa ulua
- Blue spot grouper
- Porgy

C. Reef Fish

- Reef jacks (unclassified)
- Squirrelfish
- Trumpetfish
- Scorpionfish
- Mountain bass
- Bigeyes
- Cardinalfish
- Goatfish
- Rudderfish
- Butterflyfish
- Damselfish
- Hawkfish
- Tilapia
- Wrasse
- Parrotfish
- Gobies
- Surgeonfish-tangs
- Flounders
- Triggerfish
- Filefish
- Pufferfish

D. Other

Miscellaneous
Rays
Eels
Bigeye scad (akule)
Mackerel scad (opelu)
Leatherback
Anchovy
Ten pounder
Bonefish
Herring-sardine
Milkfish
Flyingfish
Needlefish
Halfbeaks
Threadfin
Mullet
Pomfret
Snake mackerel
Freshwater fish
Spiny lobster
Slipper lobster
Crabs
Shrimp (freshwater)
Shrimp (saltwater)
Octopus
Squid
Limpets (saltwater)
Limpets (freshwater)
Clams
Stoney corals
Precious corals
Sea urchins
Sea cucumbers
Sea turtles
Algae

Table V.1.1

Hawaii 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	479	11,353	23,571	2.08
Sharks	178	17,805	17,556	0.99
Eels	108	1,415	759	0.54
Alfonsin	6	49	66	1.35
Bigeye scad (akule)	2,113	322,498	592,964	1.84
Mackerel scad	2,755	273,873	438,845	1.60
Leatherback	73	630	529	0.84
Ten pounder	29	956	905	0.95
Bonefish	234	8,425	8,404	1.00
Herring/sardine	2	18	24	1.33
Milkfish	44	1,462	2,308	1.58
Flying fish	2	2	1	0.30
Needlefish	224	5,634	4,466	0.79
Halfbeaks	24	340	839	2.47
Threadfin	230	4,065	18,479	4.55
Mullet	315	7,579	19,767	2.61
Pomfret	182	6,075	12,009	1.98
Snake mackerel	20	660	174	0.26
Jacks (misc)	3,084	97,600	157,870	1.62
Amberjack	287	19,246	12,933	0.67
Blue crevally	674	14,684	34,457	2.35
Pig-lipped ulua	362	33,969	46,094	1.36
Dobe ulua	100	3,347	4,854	1.45
Paapaa ulua	573	10,141	21,636	2.13
White ulua	369	33,601	54,183	1.61
Black ulua	27	762	1,358	1.78
Giant sea bass	702	33,522	78,526	2.34
Blue spot grouper	116	1,446	3,435	2.38
Snappers	281	3,045	10,090	3.31
Blue lined snapper	1,685	42,062	47,025	1.12
Ehu (red snapper)	2,198	49,107	161,298	3.28
Gindai (flower snapper)	333	2,611	7,545	2.89
Kalekale (pink snapper)	1,041	11,297	24,811	2.20
Lehi (silverjaw)	1,607	49,419	146,781	2.97
Onaga (red snapper)	2,575	154,194	714,614	4.63
Opakapaka (pink snapper)	5,455	341,778	1,212,348	3.55
Uku (gray snapper)	3,772	342,235	869,898	2.54
Porgy	133	3,958	5,452	1.38
Reef jacks	4	63	290	4.60
Squirrelfish	1,575	36,914	88,864	2.41
Trumpetfish	14	259	1,757	6.78
Scorpionfish	516	2,803	7,492	2.67
Mountain bass	406	10,496	21,314	2.03
Bigeyes	845	10,434	19,476	1.87
Cardinalfish	6	17	32	1.89

Table V.1.1 (cont.)

Species	Records	Pounds	Value	$/lb
Goatfish	2,850	66,522	149,387	2.25
Rudderfish	547	15,350	10,405	0.68
Damselfish	94	709	915	1.29
Hawkfish	127	1,494	1,271	0.85
Tilapia	21	3,142	10,241	3.26
Wrasse	1,168	12,740	24,759	1.94
Parrotfish	1,025	52,165	57,404	1.10
Surgeon/tangs	2,668	56,663	60,848	1.07
Flounders	8	19	18	0.97
Triggerfish	15	50	41	0.83
Filefish	53	313	226	0.72
Pufferfish	4	62	375	6.05
Rainbow runner	791	25,469	34,559	1.36
Mahimahi (dolphin)	5,315	285,158	887,591	3.11
Barracudas	850	18,255	24,404	1.34
Wahoo	6,035	344,014	945,533	2.75
Japanese mackerel	2	8	11	1.38
Tunas	19	217	337	1.55
Skipjack tuna	5,130	4,059,181	4,266,863	1.05
Yellowfin tuna	13,009	2,395,631	4,489,821	1.87
Albacore	298	55,100	80,942	1.47
Bigeye tuna	309	287,877	1,027,163	3.57
Kawakawa	689	15,132	17,013	1.12
Billfish	6	797	2,210	2.77
Broadbill swordfish	149	20,653	57,617	2.79
Blue marlin	2,698	580,990	503,651	0.87
Black marlin	99	20,579	18,186	0.88
Striped marlin	1,455	230,676	267,711	1.16
Shortnose spearfish	614	33,795	56,412	1.67
Sailfish	36	4,470	5,827	1.30
Ocean moonfish	53	14,273	21,589	1.51
Spiny lobster	1,020	305,177	2,970,562	9.73
Slipper lobster	788	61,516	554,376	9.01
Crabs	358	27,083	109,478	4.04
Shrimp (freshwater)	4	46	300	6.51
Shrimp (saltwater)	2	400	1,300	3.25
Octopus	796	23,122	50,028	2.16
Squid	150	6,452	10,493	1.63
Limpets (saltwater)	310	11,740	30,587	2.61
Stoney corals	34	3,104	4,130	1.33
Precious corals	7	203	3,045	15.00
Sea urchins	2	34	53	1.56
Algae	846	15,502	42,364	2.73
** TOTAL **	86,212	11,027,732	21,696,145	

Table V.1.2

Hawaii 1988 Commercial Landings (not sold)

Species	Records	Pounds
Miscellaneous	9	48
Sharks	49	6,737
Eels	7	54
Bigeye scad (akule)	336	14,286
Mackerel scad	380	6,713
Leatherback	43	144
Ten pounder	3	15
Bonefish	53	805
Milkfish	10	77
Needlefish	19	91
Halfbeaks	2	4
Threadfin	25	187
Mullet	52	1,103
Pomfret	2	42
Snake mackerel	3	87
Jacks (misc)	572	7,786
Amberjack	437	23,256
Blue crevally	51	500
Pig-lipped ulua	8	177
Dobe ulua	15	270
Paapaa ulua	14	220
White ulua	24	555
Giant sea bass	36	352
Blue spot grouper	3	9
Snappers	9	38
Blue lined snapper	228	2,339
Ehu (red snapper)	219	1,778
Gindai (flower snapper)	20	79
Kalekale (pink snapper)	88	1,067
Lehi (silverjaw)	75	1,533
Onaga (red snapper)	166	2,885
Opakapaka (pink snapper)	609	10,423
Uku (gray snapper)	282	5,532
Porgy	21	230
Squirrelfish	134	1,252
Trumpetfish	8	531
Scorpionfish	34	180
Mountain bass	68	464
Bigeyes	106	666
Cardinalfish	1	4
Goatfish	465	3,778
Rudderfish	65	602
Damselfish	10	46
Hawkfish	11	77
Tilapia	7	150

Table V.1.2 (cont.)

Species	Records	Pounds
Wrasse	154	1,264
Parrotfish	111	1,485
Surgeon/tangs	347	3,596
Triggerfish	15	200
Filefish	6	22
Pufferfish	8	34
Rainbow runner	68	840
Mahimahi (dolphin)	791	16,300
Barracudas	126	1,415
Wahoo	778	18,957
Japanese mackerel	3	13
Tunas	4	37
Skipjack tuna	3,274	88,593
Yellowfin tuna	2,343	98,578
Albacore	12	1,405
Bigeye tuna	72	11,513
Kawakawa	884	10,318
Frigate tuna	2	10
Billfish	2	47
Broadbill swordfish	1	35
Blue marlin	346	60,530
Black marlin	4	390
Striped marlin	260	16,447
Shortnose spearfish	115	4,141
Sailfish	8	313
Ocean moonfish	1	700
Spiny lobster	327	27,723
Slipper lobster	238	4,048
Crabs	78	1,358
Shrimp (saltwater)	2	500
Octopus	266	5,204
Squid	47	941
Limpets (saltwater)	39	1,539
Stoney corals	51	8,955
Precious corals	13	312
Sea urchins	25	273
Sea cucumbers	1	37
Algae	233	1,059
** TOTAL **	15,834	486,304

Table V.1.3

Hawaii January 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	52	1,265	2,537	2.01
Sharks	13	1,558	1,756	1.13
Eels	10	125	53	0.43
Bigeye scad (akule)	166	9,299	25,492	2.74
Mackerel scad	273	20,380	38,798	1.90
Leatherback	2	18	18	1.00
Ten pounder	4	124	125	1.01
Bonefish	26	513	523	1.02
Milkfish	11	185	168	0.91
Needlefish	37	1,636	1,620	0.99
Threadfin	21	332	1,483	4.47
Mullet	12	546	1,659	3.04
Pomfret	14	470	1,128	2.40
Snake mackerel	2	39	10	0.25
Jacks (misc)	202	4,905	9,388	1.91
Amberjack	42	2,317	1,547	0.67
Blue crevally	40	379	1,021	2.69
Pig-lipped ulua	61	4,513	7,754	1.72
Dobe ulua	23	1,390	1,973	1.42
Paapaa ulua	48	977	2,384	2.44
White ulua	10	631	1,259	2.00
Black ulua	8	191	410	2.15
Giant sea bass	83	4,336	10,561	2.44
Blue spot grouper	7	51	125	2.45
Snappers	29	90	336	3.73
Blue lined snapper	219	5,232	6,476	1.24
Ehu (red snapper)	238	5,505	18,414	3.34
Gindai (flower snapper)	45	500	1,471	2.94
Kalekale (pink snapper)	138	1,961	4,566	2.33
Lehi (silverjaw)	140	7,142	27,143	3.80
Onaga (red snapper)	239	14,663	70,462	4.81
Opakapaka (pink snapper)	529	37,272	143,411	3.85
Uku (gray snapper)	175	7,683	27,103	3.53
Porgy	6	52	154	2.95
Squirrelfish	221	4,105	13,147	3.20
Trumpetfish	3	27	25	0.93
Scorpionfish	43	229	584	2.55
Mountain bass	23	384	1,053	2.74
Bigeyes	122	979	1,853	1.89
Cardinalfish	1	3	4	1.25
Goatfish	216	6,961	14,242	2.05
Rudderfish	35	338	312	0.92

Table V.1.3 (cont.)

Species	Records	Pounds	Value	$/lb
Damselfish	1	2	3	1.33
Hawkfish	13	131	218	1.66
Tilapia	2	476	923	1.94
Wrasse	81	897	1,880	2.10
Parrotfish	79	2,226	3,319	1.49
Surgeon/tangs	181	5,162	4,546	0.88
Triggerfish	3	5	2	0.40
Filefish	4	14	6	0.46
Rainbow runner	54	2,010	3,548	1.77
Mahimahi (dolphin)	405	20,467	72,017	3.52
Barracudas	93	1,187	1,469	1.24
Wahoo	115	8,949	34,548	3.86
Skipjack tuna	334	307,329	324,582	1.06
Yellowfin tuna	1,108	261,189	454,422	1.74
Albacore	5	2,367	3,712	1.57
Bigeye tuna	13	21,078	102,369	4.86
Kawakawa	55	1,529	1,701	1.11
Broadbill swordfish	1	98	372	3.80
Blue marlin	108	27,278	24,536	0.90
Black marlin	9	2,739	2,394	0.87
Striped marlin	182	22,281	26,389	1.18
Shortnose spearfish	32	1,940	4,229	2.18
Sailfish	2	90	121	1.34
Ocean moonfish	5	543	1,114	2.05
Spiny lobster	69	11,540	124,950	10.83
Slipper lobster	27	3,058	27,749	9.07
Crabs	27	2,270	8,643	3.81
Shrimp (freshwater)	1	19	95	5.00
Octopus	60	1,600	3,236	2.02
Squid	1	80	140	1.75
Limpets (saltwater)	19	339	910	2.69
Algae	49	361	972	2.69
** SUBTOTAL **	6,727	858,560	1,677,661	

Table V.1.4

Hawaii February 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	48	1,832	3,816	2.08
Sharks	15	2,277	2,376	1.04
Eels	17	147	45	0.31
Alfonsin	1	11	22	2.00
Bigeye scad (akule)	209	32,202	70,749	2.20
Mackerel scad	240	15,972	32,500	2.03
Leatherback	5	22	29	1.30
Ten pounder	2	80	79	0.99
Bonefish	30	715	691	0.97
Herring/sardine	1	3	2	0.50
Milkfish	3	110	200	1.82
Needlefish	38	1,026	900	0.88
Threadfin	13	223	1,121	5.03
Mullet	8	233	635	2.73
Pomfret	22	371	690	1.86
Jacks (misc)	252	8,305	13,604	1.64
Amberjack	34	2,469	1,636	0.66
Blue crevally	36	315	737	2.34
Pig-lipped ulua	52	8,275	10,809	1.31
Dobe ulua	13	439	721	1.64
Paapaa ulua	68	1,187	2,974	2.51
White ulua	23	1,161	2,208	1.90
Black ulua	4	78	129	1.65
Giant sea bass	99	5,166	13,275	2.57
Blue spot grouper	14	83	174	2.10
Snappers	23	59	215	3.65
Blue lined snapper	219	5,267	6,280	1.19
Ehu (red snapper)	268	5,851	18,641	3.19
Gindai (flower snapper)	61	400	1,145	2.86
Kalekale (pink snapper)	155	1,916	4,146	2.16
Lehi (silverjaw)	195	5,442	16,908	3.11
Onaga (red snapper)	271	14,601	64,745	4.43
Opakapaka (pink snapper)	616	41,759	138,524	3.32
Uku (gray snapper)	279	10,629	32,617	3.07
Porgy	17	263	618	2.35
Squirrelfish	186	3,679	10,323	2.81
Trumpetfish	3	10	10	1.03
Scorpionfish	44	188	538	2.86
Mountain bass	18	737	1,607	2.18
Bigeyes	108	825	1,317	1.60
Goatfish	294	9,065	20,469	2.26
Rudderfish	54	826	712	0.86

Table V.1.4 (cont.)

Species	Records	Pounds	Value	$/lb
Damselfish	8	50	57	1.15
Hawkfish	5	30	38	1.26
Tilapia	2	305	1,072	3.51
Wrasse	75	567	1,036	1.83
Parrotfish	100	3,184	4,821	1.51
Surgeon/tangs	251	7,591	7,012	0.92
Triggerfish	1	2	2	0.85
Filefish	5	29	10	0.34
Rainbow runner	70	2,452	3,199	1.30
Mahimahi (dolphin)	866	40,626	102,494	2.52
Barracudas	101	1,229	1,669	1.36
Wahoo	229	17,006	60,434	3.55
Japanese mackerel	1	6	9	1.50
Tunas	2	27	33	1.22
Skipjack tuna	447	227,916	253,915	1.11
Yellowfin tuna	1,326	198,472	406,166	2.05
Albacore	4	398	770	1.94
Bigeye tuna	26	24,204	110,193	4.55
Kawakawa	55	1,306	1,190	0.91
Broadbill swordfish	2	94	276	2.94
Blue marlin	92	27,532	26,464	0.96
Black marlin	4	831	1,055	1.27
Striped marlin	337	32,950	42,915	1.30
Shortnose spearfish	113	4,031	5,793	1.44
Sailfish	4	209	430	2.06
Ocean moonfish	3	1,709	2,767	1.62
Spiny lobster	145	24,913	297,956	11.96
Slipper lobster	108	13,968	127,821	9.15
Crabs	46	1,852	7,956	4.30
Shrimp (freshwater)	1	20	100	5.00
Octopus	55	1,300	2,631	2.02
Limpets (saltwater)	17	481	1,270	2.64
Stoney corals	9	765	677	0.88
Sea urchins	1	2	5	2.50
Algae	39	1,029	2,881	2.80
** SUBTOTAL **	8,608	821,305	1,954,053	

Table V.1.5

Hawaii March 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	41	1,468	3,270	2.23
Sharks	16	1,560	1,754	1.12
Eels	14	183	177	0.96
Alfonsin	1	6	3	0.50
Bigeye scad (akule)	232	51,964	92,220	1.77
Mackerel scad	199	13,673	25,376	1.86
Leatherback	10	106	103	0.97
Ten pounder	4	102	98	0.96
Bonefish	25	638	511	0.80
Milkfish	1	3	2	0.65
Needlefish	31	269	295	1.10
Halfbeaks	2	7	5	0.70
Threadfin	21	308	1,217	3.95
Mullet	77	1,189	3,104	2.61
Pomfret	19	880	1,814	2.06
Snake mackerel	1	50	13	0.25
Jacks (misc)	229	7,107	12,488	1.76
Amberjack	48	3,737	2,587	0.69
Blue crevally	66	769	1,978	2.57
Pig-lipped ulua	59	2,519	5,269	2.09
Dobe ulua	10	57	231	4.06
Paapaa ulua	78	1,646	3,773	2.29
White ulua	46	4,076	9,986	2.45
Black ulua	3	129	271	2.10
Giant sea bass	68	3,617	8,162	2.26
Blue spot grouper	12	550	1,615	2.94
Snappers	27	148	714	4.83
Blue lined snapper	195	6,400	7,709	1.20
Ehu (red snapper)	228	4,498	14,465	3.22
Gindai (flower snapper)	27	168	536	3.19
Kalekale (pink snapper)	99	1,035	2,486	2.40
Lehi (silverjaw)	167	3,981	11,864	2.98
Onaga (red snapper)	214	14,090	65,694	4.66
Opakapaka (pink snapper)	564	32,346	112,539	3.48
Uku (gray snapper)	380	21,256	63,259	2.98
Porgy	11	236	450	1.91
Reef jacks	2	26	123	4.72
Squirrelfish	127	2,911	6,870	2.36
Trumpetfish	2	24	22	0.90
Scorpionfish	46	221	689	3.12
Mountain bass	39	837	1,796	2.15
Bigeyes	75	903	1,800	1.99

Table V.1.5 (cont.)

Species	Records	Pounds	Value	$/lb
Goatfish	288	7,443	15,212	2.04
Rudderfish	83	1,344	1,332	0.99
Damselfish	16	107	138	1.29
Hawkfish	12	75	116	1.54
Tilapia	1	284	1,053	3.71
Wrasse	118	1,067	2,130	2.00
Parrotfish	105	3,970	6,011	1.51
Surgeon/tangs	274	4,767	6,038	1.27
Flounders	1	2	3	1.28
Filefish	10	71	48	0.67
Rainbow runner	71	2,242	3,443	1.54
Mahimahi (dolphin)	778	41,331	108,731	2.63
Barracudas	121	1,603	2,279	1.42
Wahoo	376	20,782	75,406	3.63
Tunas	2	67	213	3.17
Skipjack tuna	522	229,745	362,859	1.58
Yellowfin tuna	1,277	150,831	334,203	2.22
Albacore	5	856	2,783	3.25
Bigeye tuna	21	25,976	128,074	4.93
Kawakawa	92	1,995	2,949	1.48
Broadbill swordfish	3	488	2,025	4.15
Blue marlin	94	25,055	30,249	1.21
Black marlin	3	449	583	1.30
Striped marlin	150	19,514	35,020	1.79
Shortnose spearfish	71	3,841	7,486	1.95
Sailfish	3	191	317	1.66
Ocean moonfish	4	705	1,045	1.48
Spiny lobster	139	17,977	192,219	10.69
Slipper lobster	89	4,669	43,358	9.29
Crabs	35	2,328	10,603	4.55
Shrimp (freshwater)	1	5	100	20.00
Shrimp (saltwater)	2	400	1,300	3.25
Octopus	64	1,861	3,855	2.07
Limpets (saltwater)	17	573	1,618	2.82
Stoney corals	7	1,060	935	0.88
Precious corals	7	203	3,045	15.00
Algae	46	1,499	2,666	1.78
** SUBTOTAL **	8,424	761,069	1,856,778	

Table V.1.6

Hawaii April 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	40	1,486	3,266	2.20
Sharks	12	1,517	1,638	1.08
Eels	11	121	40	0.33
Bigeye scad (akule)	200	23,898	42,893	1.79
Mackerel scad	169	9,726	17,387	1.79
Leatherback	7	38	75	1.98
Ten pounder	2	32	29	0.91
Bonefish	10	252	212	0.84
Needlefish	19	117	176	1.50
Threadfin	19	409	1,773	4.33
Mullet	37	479	1,283	2.68
Pomfret	16	579	1,138	1.96
Snake mackerel	1	29	7	0.25
Jacks (misc)	239	8,105	13,663	1.69
Amberjack	24	1,618	1,187	0.73
Blue crevally	73	1,218	3,568	2.93
Pig-lipped ulua	42	2,919	3,399	1.16
Dobe ulua	12	315	502	1.59
Paapaa ulua	44	498	1,240	2.49
White ulua	25	2,739	4,559	1.66
Black ulua	2	15	16	1.06
Giant sea bass	50	4,923	8,246	1.68
Blue spot grouper	10	169	333	1.97
Snappers	15	86	384	4.47
Blue lined snapper	98	3,414	3,691	1.08
Ehu (red snapper)	116	2,902	9,519	3.28
Gindai (flower snapper)	27	282	716	2.54
Kalekale (pink snapper)	31	294	820	2.79
Lehi (silverjaw)	101	2,230	6,556	2.94
Onaga (red snapper)	108	7,040	39,463	5.61
Opakapaka (pink snapper)	325	18,195	74,632	4.10
Uku (gray snapper)	336	34,111	94,977	2.78
Porgy	16	558	966	1.73
Reef jacks	2	37	167	4.51
Squirrelfish	105	1,731	4,507	2.60
Trumpetfish	2	15	27	1.82
Scorpionfish	37	175	526	3.01
Mountain bass	24	856	2,012	2.35
Bigeyes	62	980	1,967	2.01
Goatfish	194	4,892	10,570	2.16
Rudderfish	48	660	703	1.07
Damselfish	5	13	17	1.34

Table V.1.6 (cont.)

Species	Records	Pounds	Value	$/lb
Hawkfish	9	56	91	1.62
Tilapia	1	306	1,110	3.63
Wrasse	59	465	852	1.83
Parrotfish	91	3,947	6,590	1.67
Surgeon/tangs	224	3,818	4,844	1.27
Flounders	1	1	1	1.00
Filefish	5	15	19	1.26
Rainbow runner	49	1,652	2,254	1.36
Mahimahi (dolphin)	707	51,025	134,024	2.63
Barracudas	76	1,110	1,735	1.56
Wahoo	694	38,113	103,561	2.72
Tunas	1	3	2	0.75
Skipjack tuna	508	124,095	158,340	1.28
Yellowfin tuna	1,204	198,155	459,736	2.32
Albacore	34	10,421	18,940	1.82
Bigeye tuna	31	25,753	113,689	4.41
Kawakawa	60	1,068	1,379	1.29
Broadbill swordfish	11	2,291	6,375	2.78
Blue marlin	69	19,615	22,376	1.14
Black marlin	7	1,485	1,962	1.32
Striped marlin	104	18,125	30,686	1.69
Shortnose spearfish	43	2,310	4,004	1.73
Sailfish	1	150	304	2.02
Ocean moonfish	7	3,933	5,474	1.39
Spiny lobster	52	5,737	56,353	9.82
Slipper lobster	21	560	5,162	9.22
Crabs	28	2,758	11,138	4.04
Octopus	47	1,253	2,627	2.10
Squid	1	9	9	1.00
Limpets (saltwater)	29	1,010	2,589	2.56
Stoney corals	7	431	793	1.84
Sea urchins	1	32	48	1.50
Algae	63	1,807	3,600	1.99
** SUBTOTAL **	6,961	661,182	1,519,514	

Table V.1.7

Hawaii May 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	53	1,002	1,998	1.99
Sharks	13	1,039	1,285	1.24
Eels	5	46	11	0.24
Bigeye scad (akule)	196	60,689	97,894	1.61
Mackerel scad	183	11,821	21,941	1.86
Leatherback	6	25	24	0.96
Ten pounder	2	104	62	0.60
Bonefish	8	160	128	0.80
Milkfish	7	124	119	0.96
Flying fish	2	2	1	0.30
Needlefish	17	153	174	1.13
Halfbeaks	2	37	53	1.44
Threadfin	16	337	1,841	5.46
Mullet	25	273	739	2.71
Pomfret	10	296	529	1.79
Snake mackerel	1	17	4	0.25
Jacks (misc)	246	7,541	11,591	1.54
Amberjack	20	1,936	784	0.41
Blue crevally	57	3,814	8,303	2.18
Pig-lipped ulua	32	2,538	3,167	1.25
Dobe ulua	13	242	229	0.94
Paapaa ulua	45	674	1,651	2.45
White ulua	19	3,857	3,451	0.89
Black ulua	2	20	45	2.25
Giant sea bass	46	2,329	6,134	2.63
Blue spot grouper	13	206	353	1.71
Snappers	28	1,516	5,905	3.90
Blue lined snapper	111	3,113	3,303	1.06
Ehu (red snapper)	107	2,766	10,156	3.67
Gindai (flower snapper)	16	142	432	3.04
Kalekale (pink snapper)	41	533	1,278	2.40
Lehi (silverjaw)	127	2,475	7,491	3.03
Onaga (red snapper)	118	10,982	52,403	4.77
Opakapaka (pink snapper)	368	20,675	84,674	4.10
Uku (gray snapper)	386	40,346	92,659	2.30
Porgy	11	208	451	2.17
Squirrelfish	141	2,528	6,858	2.71
Scorpionfish	38	304	666	2.19
Mountain bass	26	812	1,799	2.22
Bigeyes	75	1,053	1,962	1.86
Cardinalfish	1	3	4	1.29
Goatfish	194	7,742	15,842	2.05

Table V.1.7 (cont.)

Species	Records	Pounds	Value	$/lb
Rudderfish	44	6,510	2,754	0.42
Damselfish	8	72	91	1.26
Hawkfish	12	37	53	1.44
Tilapia	1	198	706	3.57
Wrasse	78	786	1,453	1.85
Parrotfish	95	3,325	5,662	1.70
Surgeon/tangs	233	4,035	4,912	1.22
Triggerfish	1	4	0	0.10
Filefish	9	48	23	0.48
Rainbow runner	72	2,639	3,088	1.17
Mahimahi (dolphin)	568	32,695	98,274	3.01
Barracudas	71	1,336	1,745	1.31
Wahoo	1,064	58,899	128,098	2.17
Skipjack tuna	722	304,119	375,151	1.23
Yellowfin tuna	1,300	176,450	334,973	1.90
Albacore	10	6,891	9,612	1.39
Bigeye tuna	40	6,981	19,231	2.75
Kawakawa	77	1,438	1,456	1.01
Billfish	1	59	59	1.00
Broadbill swordfish	15	2,718	6,078	2.24
Blue marlin	101	20,929	17,399	0.83
Black marlin	7	1,837	1,677	0.91
Striped marlin	186	26,021	28,308	1.09
Shortnose spearfish	87	3,469	4,509	1.30
Sailfish	2	53	44	0.82
Ocean moonfish	3	548	750	1.37
Spiny lobster	63	13,549	139,718	10.31
Slipper lobster	55	2,896	25,245	8.72
Crabs	21	4,221	14,441	3.42
Octopus	30	674	1,405	2.08
Squid	5	101	204	2.02
Limpets (saltwater)	32	1,103	3,163	2.87
Stoney corals	5	493	1,000	2.03
Algae	104	2,200	5,479	2.49
** SUBTOTAL **	7,949	881,814	1,685,157	

Table V.1.8

Hawaii June 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	29	279	425	1.52
Sharks	12	1,284	1,189	0.93
Eels	9	97	41	0.42
Bigeye scad (akule)	118	48,811	73,392	1.50
Mackerel scad	106	6,995	14,339	2.05
Leatherback	3	8	9	1.09
Ten pounder	2	19	19	0.99
Bonefish	10	421	435	1.03
Milkfish	5	168	270	1.61
Needlefish	9	88	106	1.21
Threadfin	5	58	199	3.44
Mullet	8	164	440	2.68
Pomfret	10	557	580	1.04
Snake mackerel	1	19	5	0.25
Jacks (misc)	259	8,779	12,199	1.39
Amberjack	20	679	414	0.61
Blue crevally	70	2,577	5,928	2.30
Pig-lipped ulua	16	4,842	3,858	0.80
Dobe ulua	7	142	100	0.71
Paapaa ulua	22	290	453	1.56
White ulua	18	1,478	3,941	2.67
Black ulua	4	130	181	1.39
Giant sea bass	38	2,505	5,525	2.21
Blue spot grouper	10	41	99	2.42
Snappers	18	101	325	3.22
Blue lined snapper	101	1,934	1,879	0.97
Ehu (red snapper)	141	4,763	14,482	3.04
Gindai (flower snapper)	17	181	557	3.08
Kalekale (pink snapper)	56	764	1,411	1.85
Lehi (silverjaw)	74	1,586	3,614	2.28
Onaga (red snapper)	131	8,361	40,788	4.88
Opakapaka (pink snapper)	329	18,617	67,367	3.62
Uku (gray snapper)	328	39,308	81,476	2.07
Porgy	19	555	1,157	2.08
Squirrelfish	136	2,569	6,088	2.37
Scorpionfish	33	163	456	2.80
Mountain bass	34	1,052	1,893	1.80
Bigeyes	61	1,079	2,070	1.92
Goatfish	223	4,364	10,654	2.44
Rudderfish	36	1,063	705	0.66
Damselfish	8	71	117	1.65
Hawkfish	10	50	57	1.14

Table V.1.8 (cont.)

Species	Records	Pounds	Value	$/lb
Tilapia	2	66	216	3.27
Wrasse	83	1,348	2,792	2.07
Parrotfish	78	3,070	5,168	1.68
Surgeon/tangs	196	3,786	4,239	1.12
Flounders	1	2	0	0.08
Filefish	6	26	33	1.26
Rainbow runner	79	3,057	3,565	1.17
Mahimahi (dolphin)	277	11,661	44,799	3.84
Barracudas	50	1,361	2,257	1.66
Wahoo	918	43,452	94,717	2.18
Tunas	1	8	2	0.25
Skipjack tuna	602	686,103	527,500	0.77
Yellowfin tuna	1,321	239,474	360,004	1.50
Albacore	49	10,831	10,575	0.98
Bigeye tuna	29	14,175	18,203	1.28
Kawakawa	58	1,439	1,194	0.83
Billfish	3	675	2,025	3.00
Broadbill swordfish	32	5,284	15,414	2.92
Blue marlin	172	35,793	23,608	0.66
Black marlin	7	1,152	937	0.81
Striped marlin	126	21,507	17,801	0.83
Shortnose spearfish	50	1,677	2,012	1.20
Sailfish	3	442	291	0.66
Ocean moonfish	4	978	1,040	1.06
Spiny lobster	124	80,488	756,686	9.40
Slipper lobster	123	13,411	118,760	8.86
Crabs	10	246	820	3.33
Octopus	58	1,712	3,851	2.25
Squid	6	177	473	2.67
Limpets (saltwater)	33	1,584	4,381	2.77
Stoney corals	5	325	635	1.95
Algae	101	2,005	5,771	2.88
** SUBTOTAL **	7,153	1,354,327	2,389,011	

Table V.1.9

Hawaii July 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	33	307	395	1.29
Sharks	20	1,911	1,851	0.97
Eels	14	304	153	0.50
Alfonsin	1	10	12	1.20
Bigeye scad (akule)	102	7,505	15,558	2.07
Mackerel scad	123	9,598	19,831	2.07
Leatherback	5	53	65	1.22
Ten pounder	1	69	69	0.99
Bonefish	14	931	834	0.90
Milkfish	5	198	316	1.59
Needlefish	12	1,063	201	0.19
Halfbeaks	1	9	23	2.60
Threadfin	1	2	1	0.38
Mullet	28	688	1,706	2.48
Pomfret	13	545	1,150	2.11
Snake mackerel	1	35	12	0.35
Jacks (misc)	303	11,968	16,295	1.36
Amberjack	14	628	387	0.62
Blue crevally	65	941	2,315	2.46
Pig-lipped ulua	9	3,651	4,085	1.12
Dobe ulua	9	316	533	1.69
Paapaa ulua	36	532	1,315	2.47
White ulua	30	1,971	3,411	1.73
Black ulua	1	39	39	1.00
Giant sea bass	44	2,039	4,084	2.00
Blue spot grouper	6	50	114	2.29
Snappers	21	416	429	1.03
Blue lined snapper	123	2,745	2,811	1.02
Ehu (red snapper)	125	3,174	10,146	3.20
Gindai (flower snapper)	19	160	377	2.35
Kalekale (pink snapper)	50	444	1,102	2.48
Lehi (silverjaw)	71	1,963	4,683	2.39
Onaga (red snapper)	222	15,588	68,668	4.41
Opakapaka (pink snapper)	313	20,659	75,143	3.64
Uku (gray snapper)	338	37,607	88,926	2.36
Porgy	13	1,476	470	0.32
Squirrelfish	113	5,336	7,528	1.41
Scorpionfish	39	184	560	3.04
Mountain bass	35	699	1,422	2.03
Bigeyes	75	1,117	2,055	1.84
Goatfish	233	5,845	10,581	1.81
Rudderfish	63	1,367	950	0.70

Table V.1.9 (cont.)

Species	Records	Pounds	Value	$/lb
Damselfish	11	65	60	0.92
Hawkfish	12	803	284	0.35
Tilapia	2	240	780	3.25
Wrasse	104	1,231	2,324	1.89
Parrotfish	95	20,745	5,670	0.27
Surgeon/tangs	256	7,195	5,255	0.73
Flounders	2	6	7	1.17
Triggerfish	1	5	8	1.50
Filefish	6	36	41	1.13
Rainbow runner	85	2,904	3,886	1.34
Mahimahi (dolphin)	188	8,556	39,510	4.62
Barracudas	54	3,027	3,530	1.17
Wahoo	915	47,614	120,032	2.52
Tunas	2	10	3	0.30
Skipjack tuna	460	536,248	506,310	0.94
Yellowfin tuna	1,498	330,002	489,402	1.48
Albacore	94	9,608	12,841	1.34
Bigeye tuna	37	7,150	9,962	1.39
Kawakawa	45	728	627	0.86
Broadbill swordfish	29	6,345	16,739	2.64
Blue marlin	282	68,149	62,623	0.92
Black marlin	12	2,548	2,101	0.82
Striped marlin	51	5,682	9,777	1.72
Shortnose spearfish	41	3,572	6,404	1.79
Sailfish	12	698	1,070	1.53
Ocean moonfish	4	823	1,552	1.89
Spiny lobster	99	62,624	537,717	8.59
Slipper lobster	99	6,660	58,132	8.73
Crabs	14	503	1,805	3.59
Octopus	76	2,229	4,969	2.23
Squid	20	466	1,210	2.60
Limpets (saltwater)	42	2,502	4,347	1.74
Algae	76	2,387	8,117	3.40
** SUBTOTAL **	7,468	1,285,504	2,267,700	

Table V.1.10

Hawaii August 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	38	1,270	2,566	2.02
Sharks	13	862	539	0.62
Eels	7	134	101	0.76
Alfonsin	1	10	12	1.19
Bigeye scad (akule)	125	21,442	39,725	1.85
Mackerel scad	264	26,593	47,121	1.77
Leatherback	11	36	31	0.86
Ten pounder	5	76	84	1.11
Bonefish	19	742	856	1.15
Milkfish	4	104	176	1.69
Needlefish	15	154	180	1.17
Halfbeaks	10	94	217	2.31
Threadfin	1	2	9	4.50
Mullet	22	492	1,468	2.98
Pomfret	5	135	336	2.49
Jacks (misc)	280	7,820	12,974	1.66
Amberjack	12	785	545	0.69
Blue crevally	57	1,307	3,794	2.90
Pig-lipped ulua	14	854	1,299	1.52
Dobe ulua	4	150	207	1.38
Paapaa ulua	28	313	767	2.45
White ulua	48	1,663	4,179	2.51
Black ulua	2	82	168	2.05
Giant sea bass	56	2,600	6,515	2.51
Blue spot grouper	15	49	145	2.96
Snappers	27	192	724	3.77
Blue lined snapper	115	2,420	2,365	0.98
Ehu (red snapper)	167	4,751	14,977	3.15
Gindai (flower snapper)	19	155	524	3.38
Kalekale (pink snapper)	85	747	2,023	2.71
Lehi (silverjaw)	110	4,305	12,718	2.95
Onaga (red snapper)	209	12,537	56,445	4.50
Opakapaka (pink snapper)	384	19,671	76,140	3.87
Uku (gray snapper)	312	29,779	88,733	2.98
Porgy	8	163	287	1.76
Squirrelfish	118	2,493	6,699	2.69
Scorpionfish	56	341	963	2.82
Mountain bass	34	915	1,891	2.07
Bigeyes	70	1,391	2,553	1.84
Goatfish	288	5,146	15,254	2.96
Rudderfish	28	679	677	1.00
Damselfish	5	88	104	1.19

Table V.1.10 (cont.)

Species	Records	Pounds	Value	$/lb
Hawkfish	7	41	69	1.68
Tilapia	2	275	883	3.21
Wrasse	118	1,706	3,508	2.06
Parrotfish	101	4,009	7,279	1.82
Surgeon/tangs	227	4,712	5,879	1.25
Flounders	1	1	1	1.25
Filefish	2	7	11	1.59
Pufferfish	3	17	83	4.85
Rainbow runner	74	2,189	2,659	1.21
Mahimahi (dolphin)	187	8,403	38,797	4.62
Barracudas	56	1,419	2,082	1.47
Wahoo	667	36,141	111,423	3.08
Tunas	6	60	48	0.80
Skipjack tuna	428	404,857	418,292	1.03
Yellowfin tuna	1,225	229,937	434,726	1.89
Albacore	28	2,587	4,137	1.60
Bigeye tuna	14	1,328	2,645	1.99
Kawakawa	65	1,409	1,666	1.18
Broadbill swordfish	12	1,008	3,485	3.46
Blue marlin	363	79,424	71,541	0.90
Black marlin	9	1,586	1,224	0.77
Striped marlin	32	2,704	4,393	1.62
Shortnose spearfish	43	1,912	3,771	1.97
Sailfish	1	23	69	3.00
Spiny lobster	111	46,784	445,917	9.53
Slipper lobster	109	3,744	32,517	8.69
Crabs	30	1,126	4,230	3.76
Octopus	105	2,919	6,564	2.25
Squid	51	1,311	2,814	2.15
Limpets (saltwater)	39	1,263	3,862	3.06
Algae	89	1,280	3,820	2.98
** SUBTOTAL **	7,296	997,724	2,025,485	

Table V.1.11

Hawaii September 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	35	763	1,708	2.24
Sharks	20	1,472	1,515	1.03
Eels	8	104	61	0.59
Bigeye scad (akule)	232	15,864	33,509	2.11
Mackerel scad	337	37,060	59,198	1.60
Leatherback	12	282	137	0.49
Ten pounder	2	52	68	1.30
Bonefish	31	621	632	1.02
Milkfish	6	191	337	1.76
Needlefish	14	239	212	0.89
Halfbeaks	4	72	178	2.47
Threadfin	44	601	3,136	5.22
Mullet	41	694	1,614	2.33
Pomfret	8	265	523	1.97
Jacks (misc)	286	9,586	15,665	1.63
Amberjack	10	588	311	0.53
Blue crevally	59	957	2,195	2.29
Pig-lipped ulua	15	1,604	1,939	1.21
Dobe ulua	1	26	39	1.50
Paapaa ulua	31	557	1,029	1.85
White ulua	68	4,187	8,284	1.98
Giant sea bass	52	1,588	3,926	2.47
Blue spot grouper	6	31	98	3.15
Snappers	22	63	189	2.99
Blue lined snapper	123	2,737	3,356	1.23
Ehu (red snapper)	169	2,858	9,272	3.24
Gindai (flower snapper)	23	144	465	3.23
Kalekale (pink snapper)	93	642	1,324	2.06
Lehi (silverjaw)	150	4,845	13,704	2.83
Onaga (red snapper)	235	13,351	58,189	4.36
Opakapaka (pink snapper)	482	26,901	93,738	3.48
Uku (gray snapper)	319	26,673	75,371	2.83
Porgy	7	117	233	1.99
Squirrelfish	111	3,655	8,161	2.23
Trumpetfish	2	11	13	1.21
Scorpionfish	49	303	753	2.48
Mountain bass	40	730	1,725	2.36
Bigeyes	53	698	1,280	1.83
Goatfish	247	3,792	9,491	2.50
Rudderfish	66	954	927	0.97
Damselfish	9	39	65	1.67
Hawkfish	13	79	115	1.45

Table V.1.11 (cont.)

Species	Records	Pounds	Value	$/lb
Tilapia	2	249	858	3.44
Wrasse	114	1,291	2,564	1.99
Parrotfish	82	2,893	5,180	1.79
Surgeon/tangs	258	4,129	4,753	1.15
Triggerfish	5	11	20	1.86
Filefish	3	10	6	0.59
Pufferfish	1	45	293	6.50
Rainbow runner	55	1,800	2,844	1.58
Mahimahi (dolphin)	211	10,019	65,973	6.58
Barracudas	60	2,699	3,240	1.20
Wahoo	325	21,059	63,213	3.00
Tunas	3	35	31	0.89
Skipjack tuna	260	329,177	314,283	0.95
Yellowfin tuna	917	232,502	458,453	1.97
Albacore	25	2,840	5,646	1.99
Bigeye tuna	7	13,771	38,122	2.77
Kawakawa	39	976	1,245	1.28
Broadbill swordfish	3	117	321	2.74
Blue marlin	368	76,716	72,987	0.95
Black marlin	10	1,682	1,585	0.94
Striped marlin	17	2,091	3,196	1.53
Shortnose spearfish	23	1,750	3,595	2.05
Sailfish	3	201	320	1.59
Ocean moonfish	2	545	990	1.82
Spiny lobster	79	19,713	186,900	9.48
Slipper lobster	56	3,194	27,790	8.70
Crabs	57	5,362	23,881	4.45
Octopus	109	3,796	8,594	2.26
Squid	27	1,140	1,691	1.48
Limpets (saltwater)	16	972	2,594	2.67
Algae	88	1,024	3,090	3.02
** SUBTOTAL **	6,760	907,805	1,718,938	

Table V.1.12

Hawaii October 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	35	255	486	1.91
Sharks	18	1,414	1,229	0.87
Eels	9	105	50	0.47
Bigeye scad (akule)	202	9,418	21,089	2.24
Mackerel scad	355	47,004	66,281	1.41
Leatherback	7	29	27	0.93
Ten pounder	2	32	32	0.99
Bonefish	22	743	833	1.12
Milkfish	1	233	463	1.99
Needlefish	11	491	294	0.60
Threadfin	36	1,021	2,975	2.91
Mullet	21	682	1,620	2.38
Pomfret	13	386	728	1.89
Snake mackerel	3	96	36	0.37
Jacks (misc)	316	9,533	13,442	1.41
Amberjack	18	1,469	877	0.60
Blue crevally	91	1,620	2,797	1.73
Pig-lipped ulua	17	470	735	1.56
Dobe ulua	4	145	140	0.97
Paapaa ulua	79	1,598	2,413	1.51
White ulua	46	9,231	7,831	0.85
Black ulua	1	78	99	1.27
Giant sea bass	62	2,256	5,672	2.51
Blue spot grouper	13	132	192	1.45
Snappers	42	190	519	2.73
Blue lined snapper	177	4,803	4,749	0.99
Ehu (red snapper)	237	5,399	15,397	2.85
Gindai (flower snapper)	24	176	493	2.80
Kalekale (pink snapper)	102	949	1,669	1.76
Lehi (silverjaw)	155	5,564	14,853	2.67
Onaga (red snapper)	335	17,076	68,750	4.03
Opakapaka (pink snapper)	575	38,583	112,691	2.92
Uku (gray snapper)	402	45,714	94,184	2.06
Porgy	9	194	330	1.70
Squirrelfish	151	3,987	8,943	2.24
Scorpionfish	56	251	671	2.68
Mountain bass	64	1,926	2,937	1.52
Bigeyes	69	721	1,282	1.78
Goatfish	285	3,825	9,983	2.61
Rudderfish	48	875	638	0.73
Damselfish	12	123	165	1.34
Hawkfish	19	99	110	1.11

Table V.1.12 (cont.)

Species	Records	Pounds	Value	$/lb
Tilapia	2	222	782	3.52
Wrasse	155	1,565	2,462	1.57
Parrotfish	76	2,408	3,623	1.50
Surgeon/tangs	248	5,005	5,377	1.07
Flounders	2	7	7	0.93
Triggerfish	4	23	9	0.40
Filefish	2	36	14	0.40
Rainbow runner	79	1,849	2,281	1.23
Mahimahi (dolphin)	357	22,323	64,585	2.89
Barracudas	73	1,956	2,723	1.39
Wahoo	308	29,566	74,883	2.53
Skipjack tuna	322	362,860	373,450	1.03
Yellowfin tuna	794	203,984	325,063	1.59
Albacore	24	3,930	3,653	0.93
Bigeye tuna	36	40,927	105,873	2.59
Kawakawa	39	976	916	0.94
Billfish	2	63	126	2.00
Broadbill swordfish	13	731	2,132	2.92
Blue marlin	448	91,396	64,826	0.71
Black marlin	11	2,420	1,772	0.73
Striped marlin	45	13,476	13,266	0.98
Shortnose spearfish	34	2,415	4,377	1.81
Sailfish	2	107	80	0.75
Ocean moonfish	5	1,429	2,215	1.55
Spiny lobster	63	9,205	110,286	11.98
Slipper lobster	41	2,224	24,816	11.16
Crabs	50	4,321	17,324	4.01
Octopus	96	2,687	5,597	2.08
Squid	24	2,474	2,507	1.01
Limpets (saltwater)	17	620	2,023	3.26
Algae	68	798	2,347	2.94
** SUBTOTAL **	7,584	1,030,899	1,688,098	

Table V.1.14

Hawaii December 1988 Commercial Landings

Species	Records	Pounds	Value	$/lb
Miscellaneous	27	618	1,449	2.34
Sharks	13	1,618	1,459	0.90
Eels	1	5	8	1.55
Alfonsin	1	7	10	1.39
Bigeye scad (akule)	188	19,291	39,261	2.04
Mackerel scad	233	40,284	50,529	1.25
Leatherback	3	11	11	0.97
Bonefish	23	2,484	2,570	1.03
Needlefish	9	228	136	0.59
Halfbeaks	2	58	198	3.42
Threadfin	23	356	2,236	6.28
Mullet	6	205	679	3.31
Pomfret	28	768	1,450	1.89
Snake mackerel	8	321	69	0.21
Jacks (misc)	262	7,947	16,333	2.06
Amberjack	34	1,907	1,749	0.92
Blue crevally	26	435	1,043	2.40
Pig-lipped ulua	28	635	1,893	2.98
Dobe ulua	2	103	158	1.53
Paapaa ulua	51	1,208	2,023	1.67
White ulua	25	1,553	3,013	1.94
Giant sea bass	59	1,005	2,817	2.80
Blue spot grouper	3	25	88	3.53
Snappers	7	96	168	1.75
Blue lined snapper	114	2,508	2,808	1.12
Ehu (red snapper)	238	3,988	16,029	4.02
Gindai (flower snapper)	36	210	545	2.59
Kalekale (pink snapper)	108	1,334	2,605	1.95
Lehi (silverjaw)	169	5,952	16,105	2.71
Onaga (red snapper)	274	14,102	74,035	5.25
Opakapaka (pink snapper)	571	40,240	131,962	3.28
Uku (gray snapper)	301	28,214	68,721	2.44
Porgy	5	47	100	2.13
Squirrelfish	78	1,997	5,135	2.57
Trumpetfish	1	2	2	1.00
Scorpionfish	39	249	660	2.65
Mountain bass	29	707	1,036	1.47
Bigeyes	30	317	641	2.02
Goatfish	190	3,992	9,572	2.40
Rudderfish	12	203	192	0.95
Damselfish	2	4	4	1.06
Hawkfish	3	13	15	1.19

Table V.1.14 (cont.)

Species	Records	Pounds	Value	$/lb
Tilapia	1	250	906	3.62
Wrasse	104	829	1,656	2.00
Parrotfish	55	1,251	1,928	1.54
Surgeon/tangs	144	3,339	4,091	1.23
Rainbow runner	46	1,329	1,714	1.29
Mahimahi (dolphin)	289	11,992	43,646	3.64
Barracudas	56	792	929	1.17
Wahoo	194	11,575	40,600	3.51
Japanese mackerel	1	2	2	1.00
Tunas	2	7	5	0.72
Skipjack tuna	258	251,820	321,327	1.28
Yellowfin tuna	541	105,466	273,533	2.59
Albacore	16	3,942	7,390	1.87
Bigeye tuna	35	83,572	300,339	3.59
Kawakawa	69	1,614	1,910	1.18
Broadbill swordfish	16	862	2,706	3.14
Blue marlin	279	50,178	40,649	0.81
Black marlin	12	2,102	1,665	0.79
Striped marlin	110	39,481	33,046	0.84
Shortnose spearfish	49	5,286	7,684	1.45
Sailfish	2	2,270	2,747	1.21
Ocean moonfish	10	1,761	2,826	1.60
Spiny lobster	28	2,912	25,940	8.91
Slipper lobster	26	5,625	49,013	8.71
Crabs	16	633	2,298	3.63
Shrimp (freshwater)	1	2	5	2.25
Octopus	48	1,590	3,367	2.12
Squid	2	83	215	2.59
Limpets (saltwater)	32	1,012	2,999	2.96
Algae	57	443	1,461	3.30
** SUBTOTAL **	5,761	777,267	1,636,115	
** TOTAL **	86,212	11,027,732	21,696,145	

Figure V.1.1

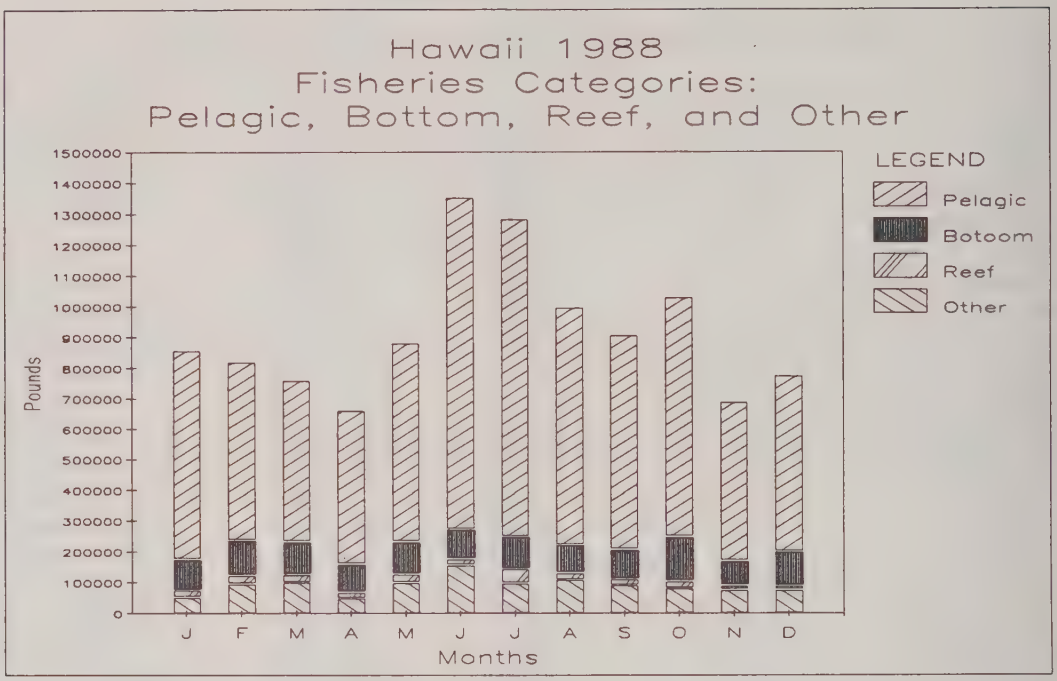


Figure V.1.2

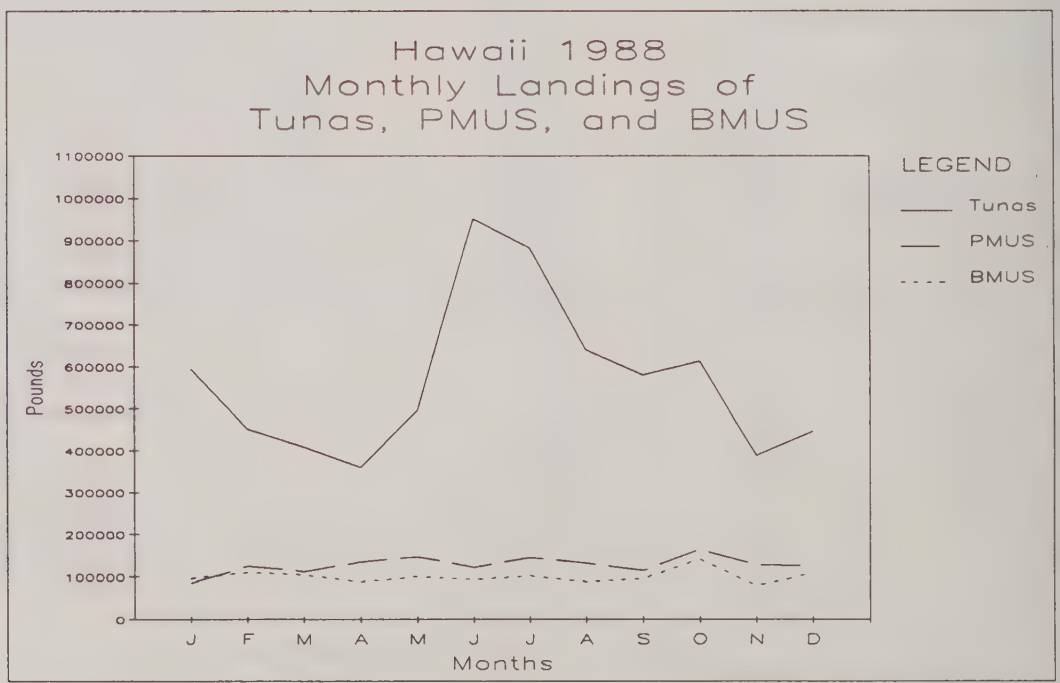


Figure V.1.3

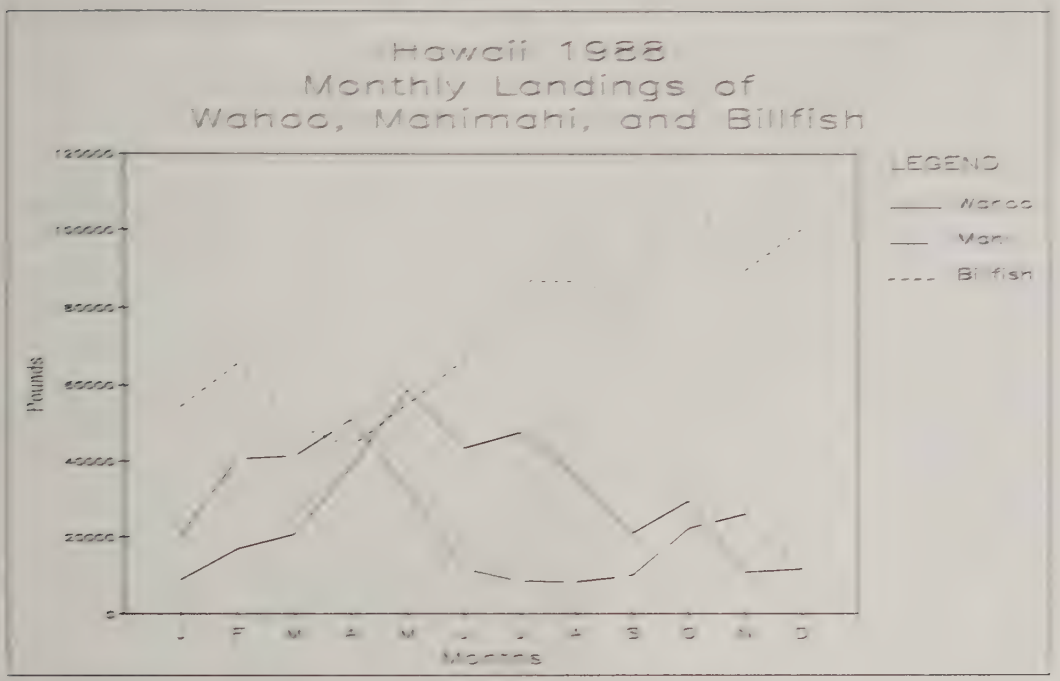


Figure V.1.4

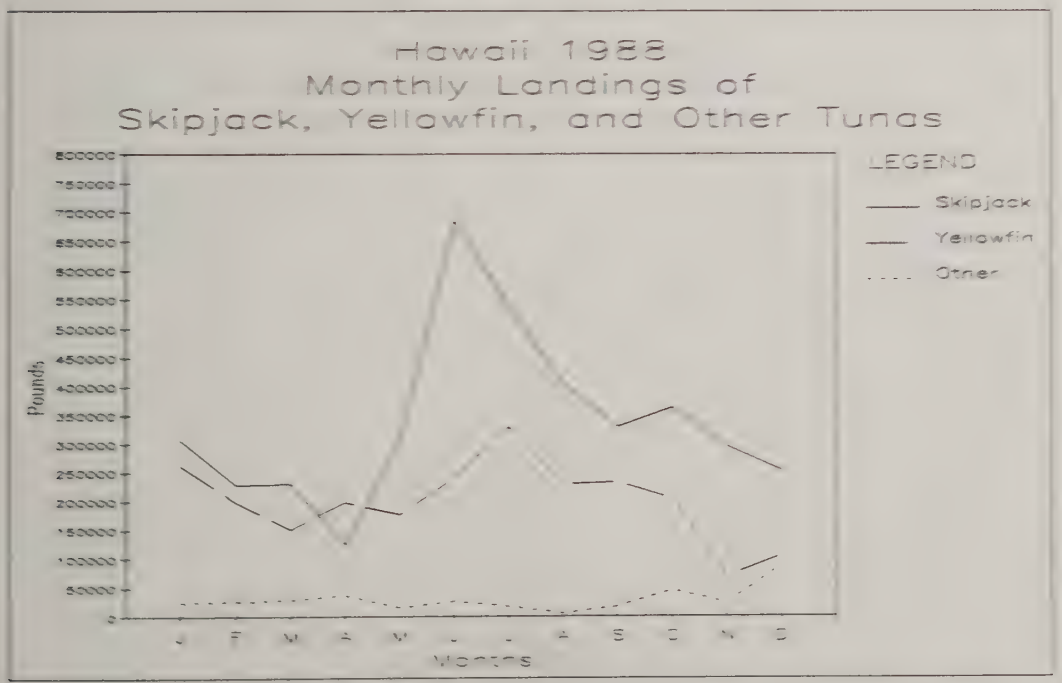
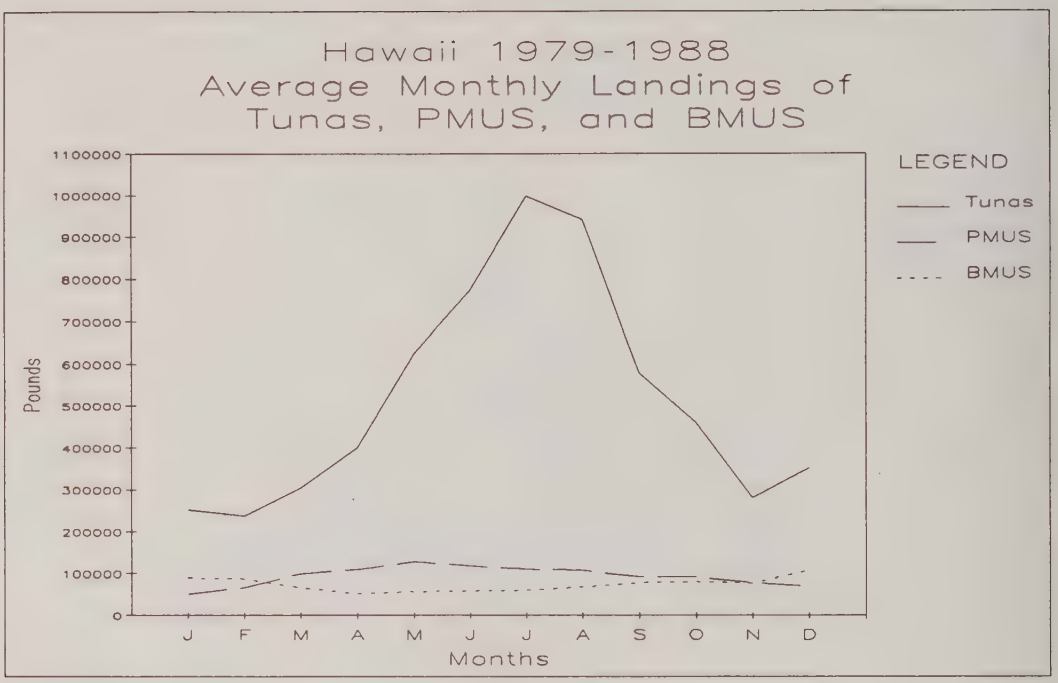


Figure V.2.1



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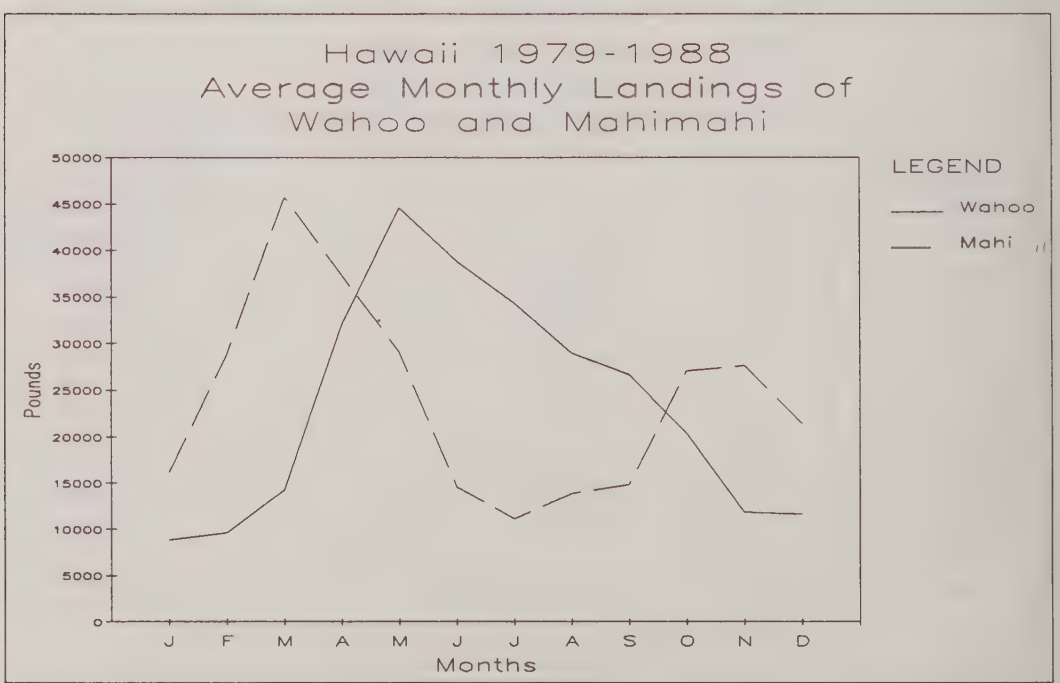

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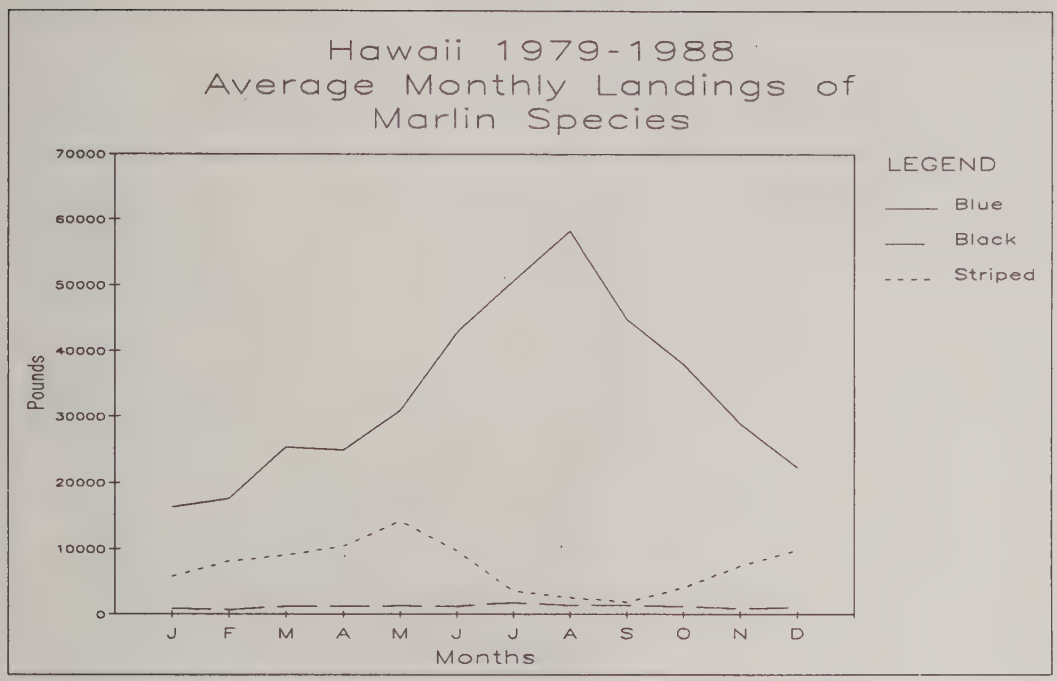

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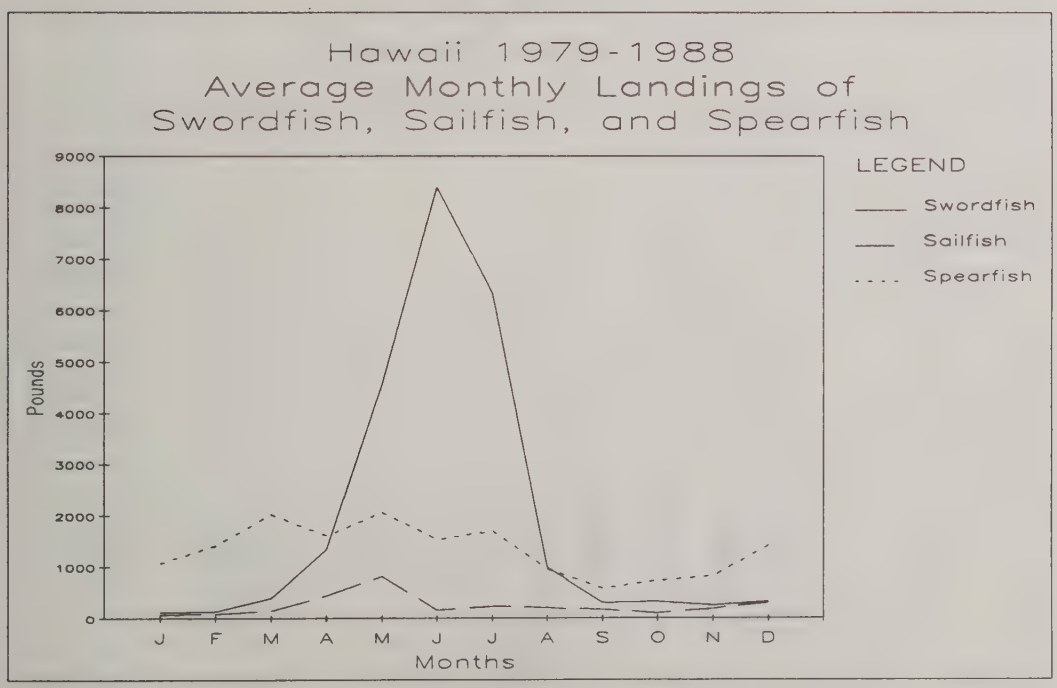

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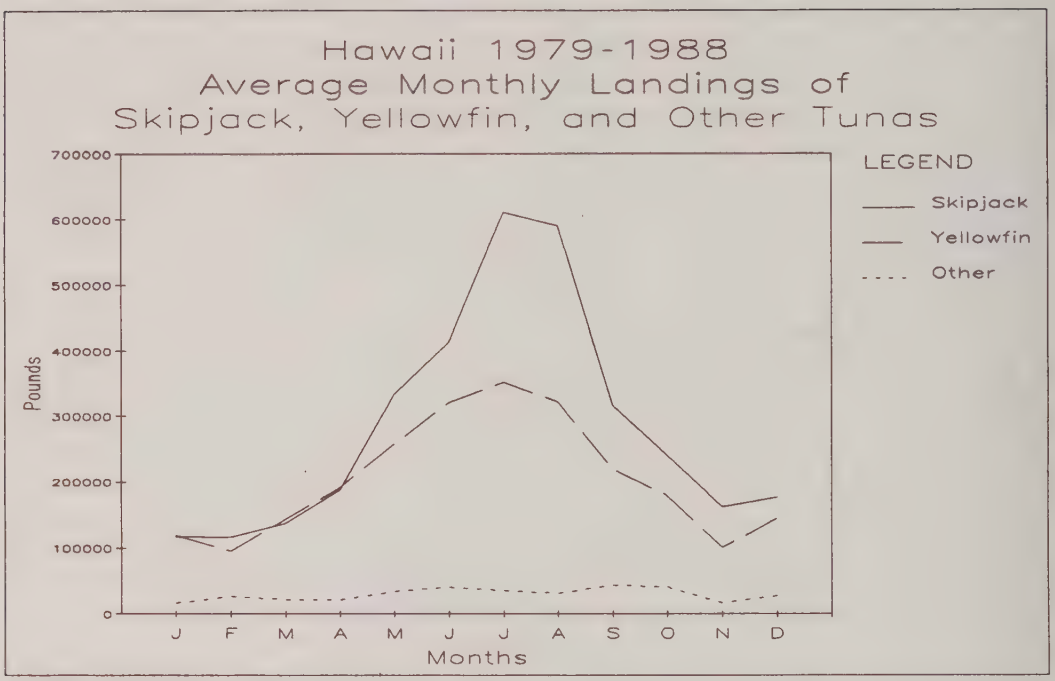

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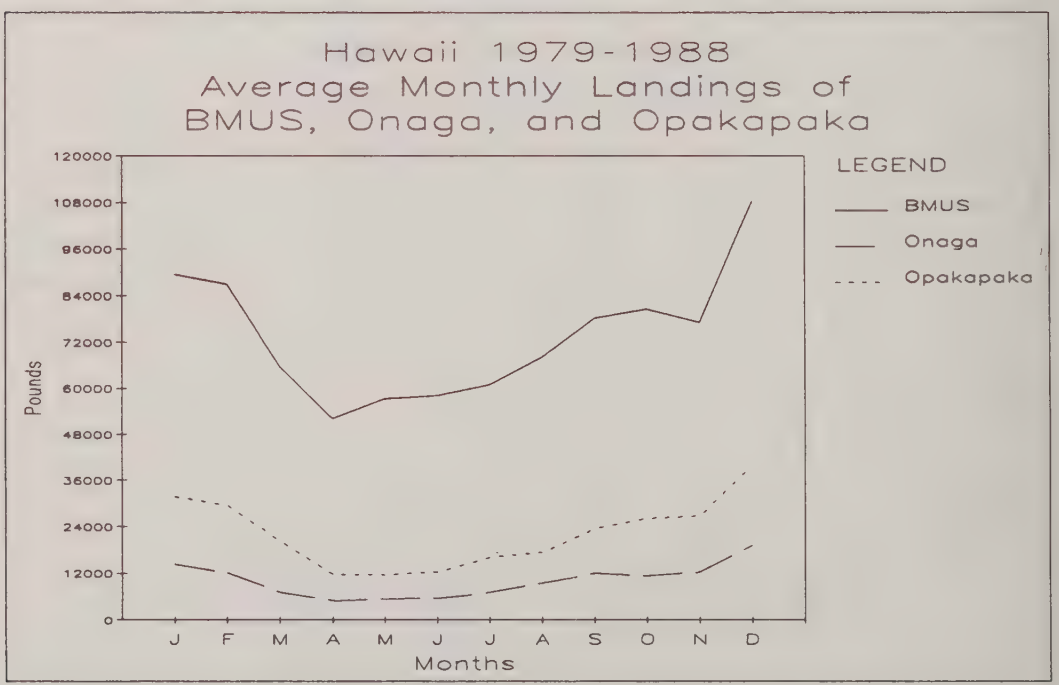


Figure V.2.7

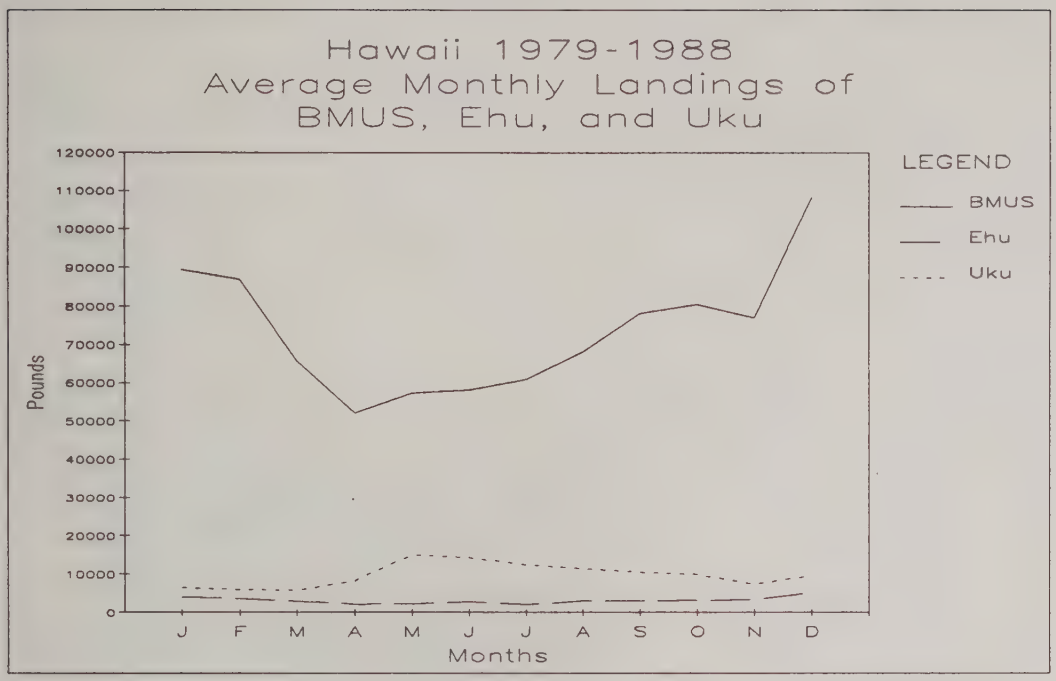
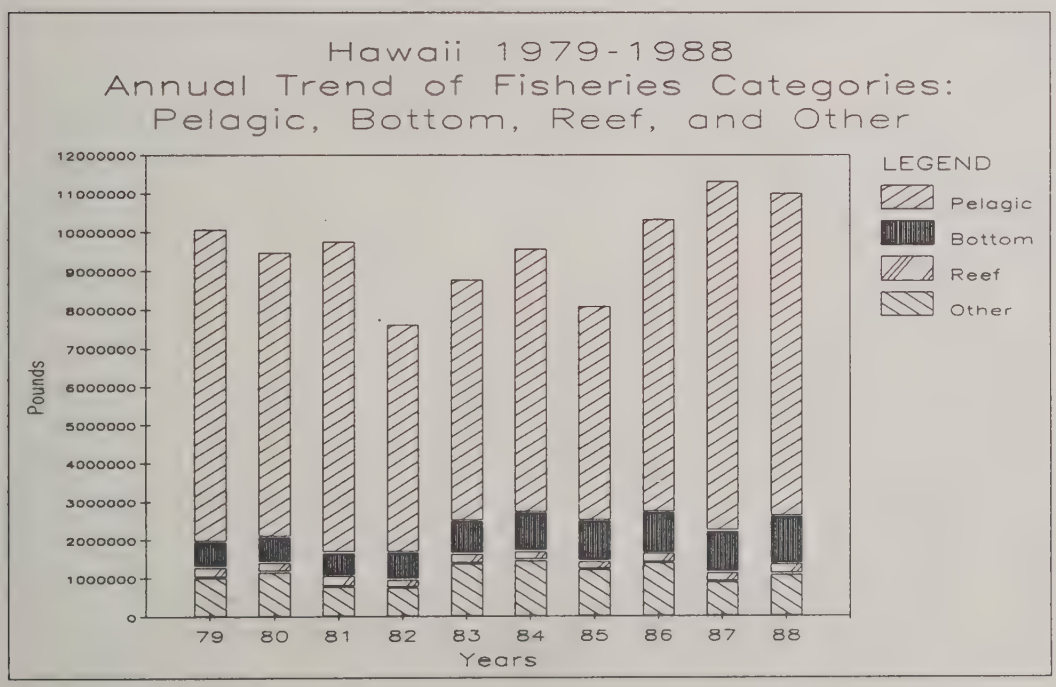


Figure V.3.1



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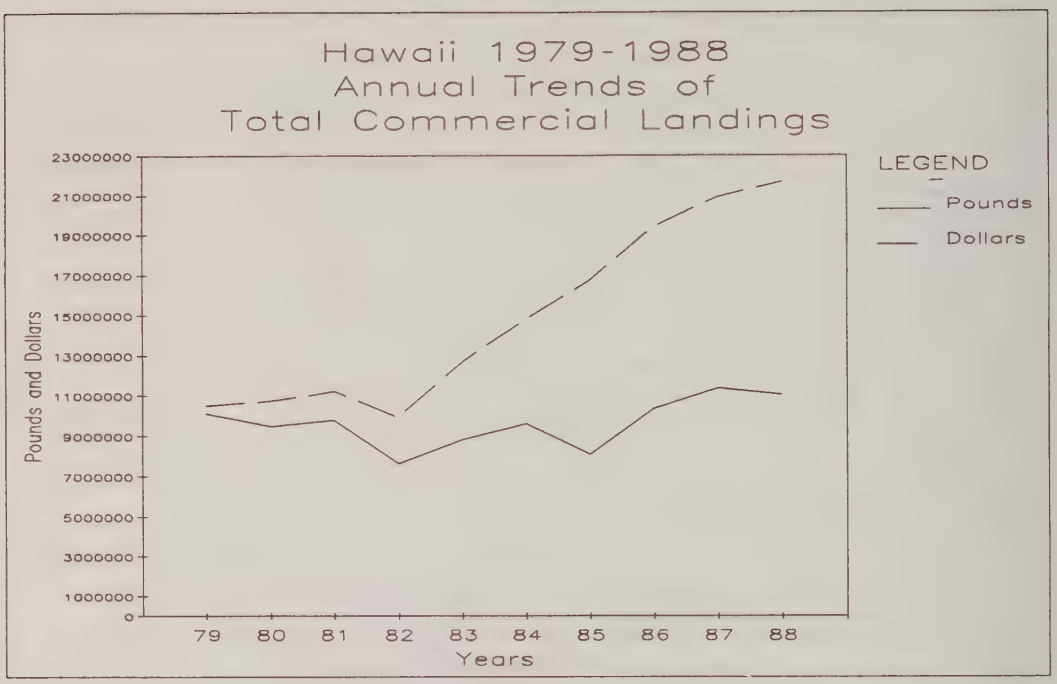

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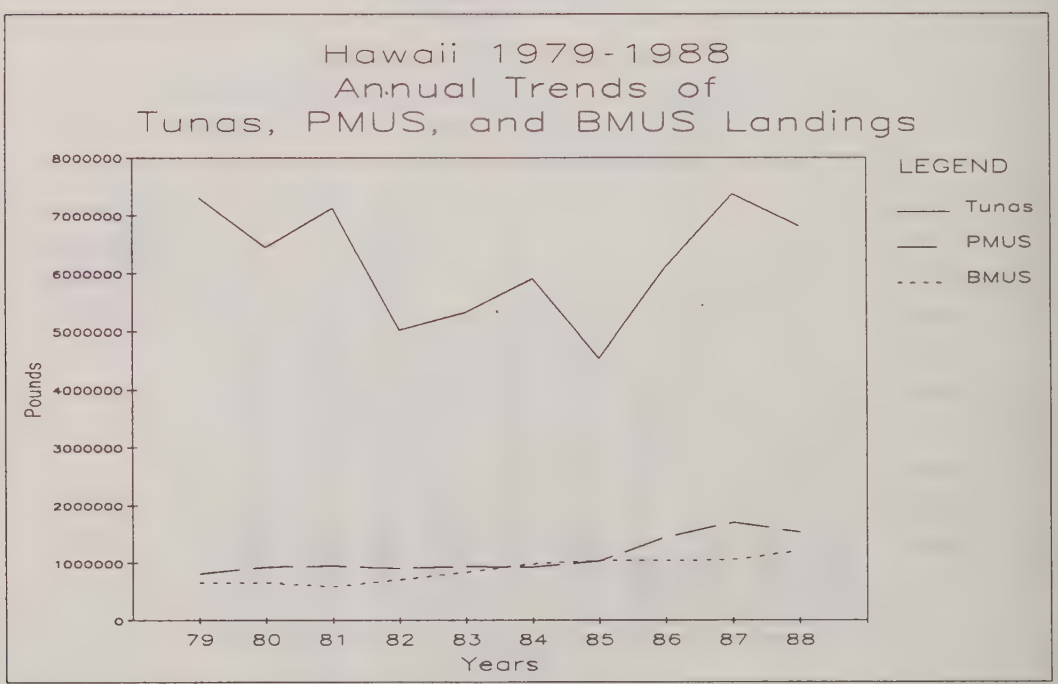
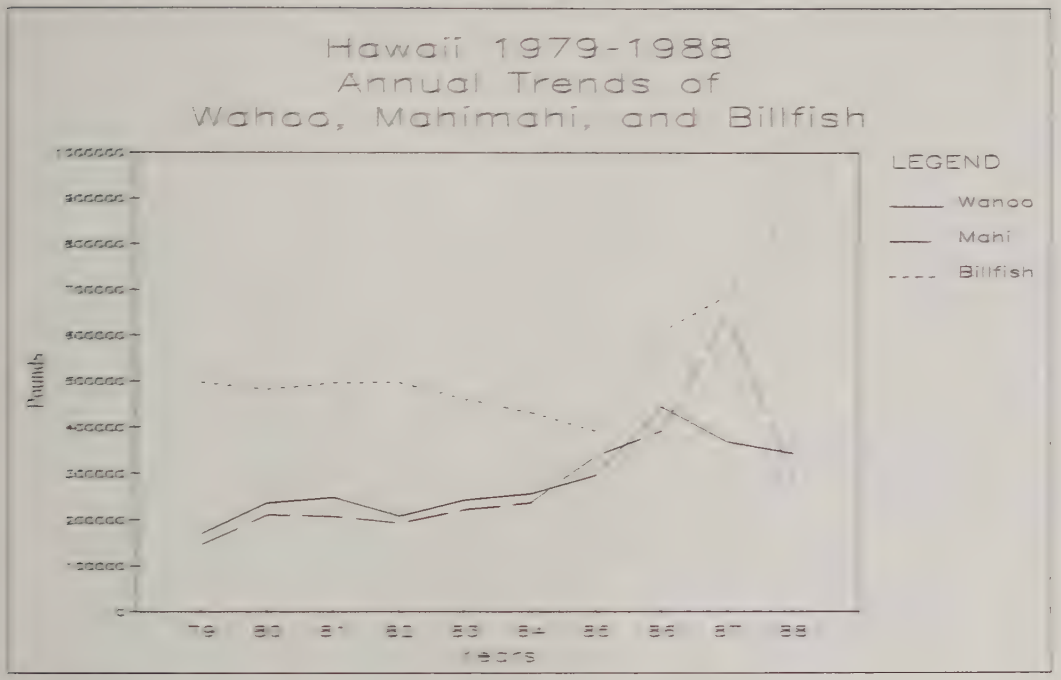


Figure V.3.4



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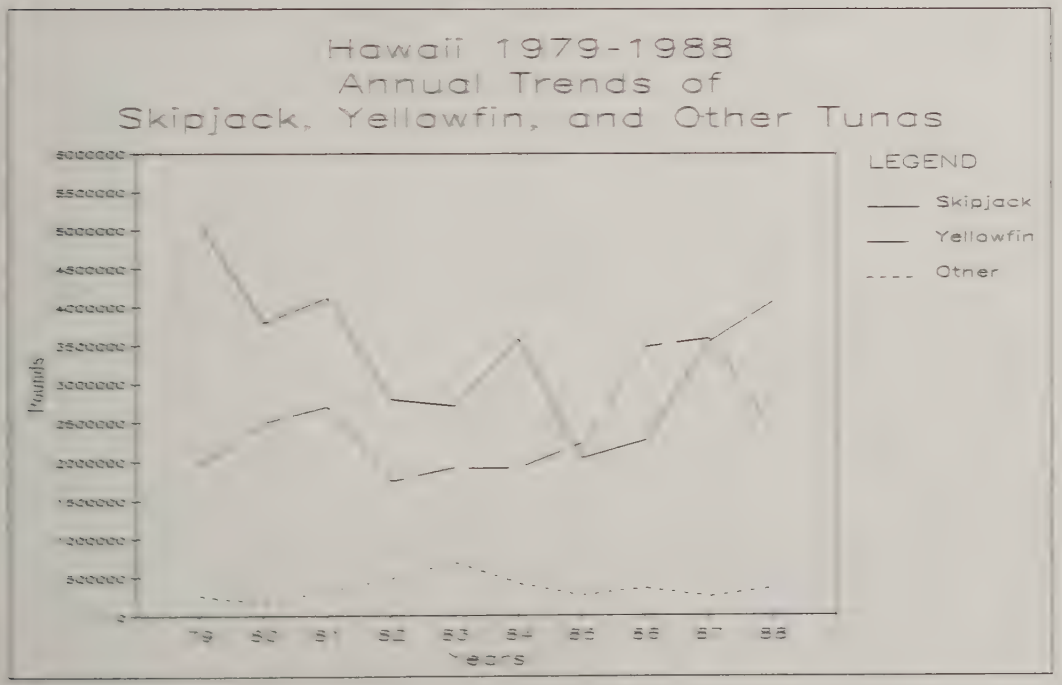

Figure V.4.1

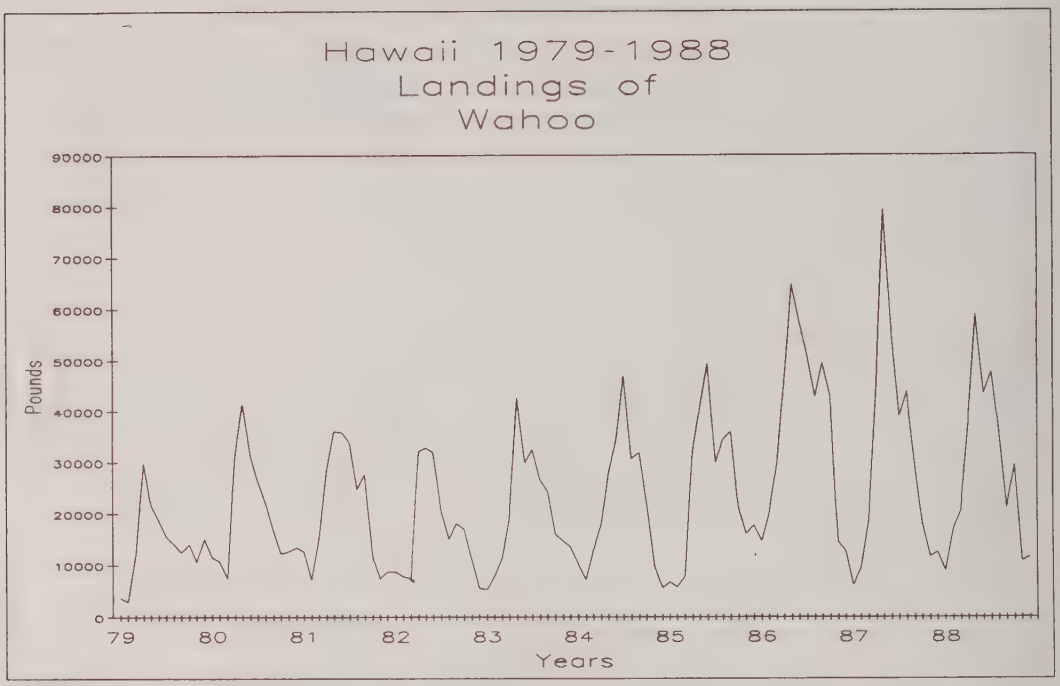

Figure V.4.2

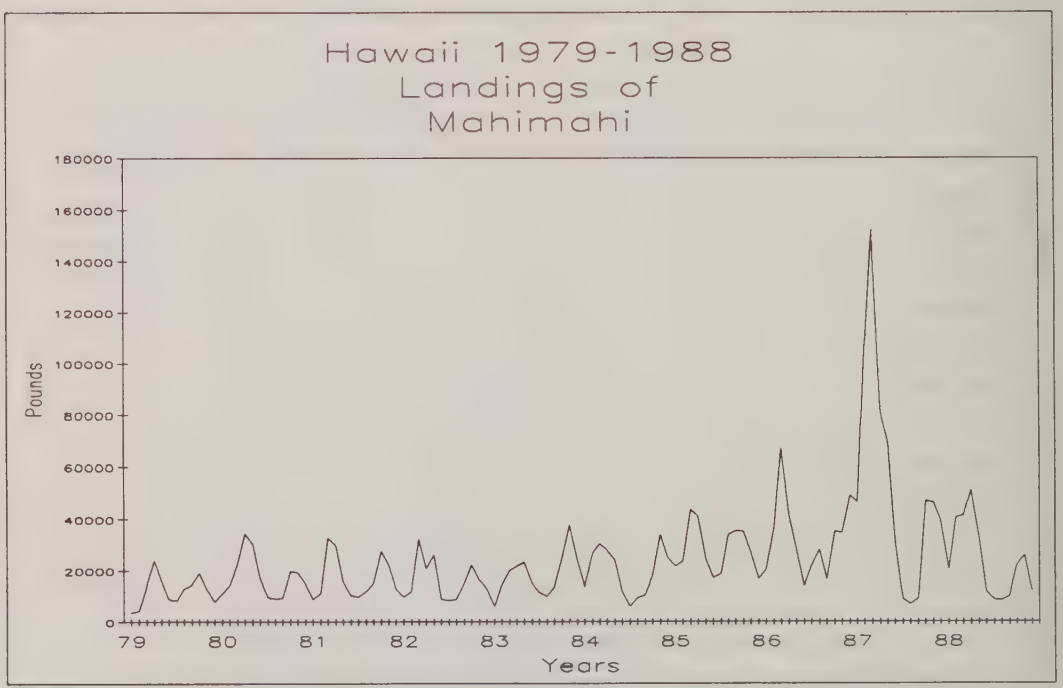

Figure V.4.3

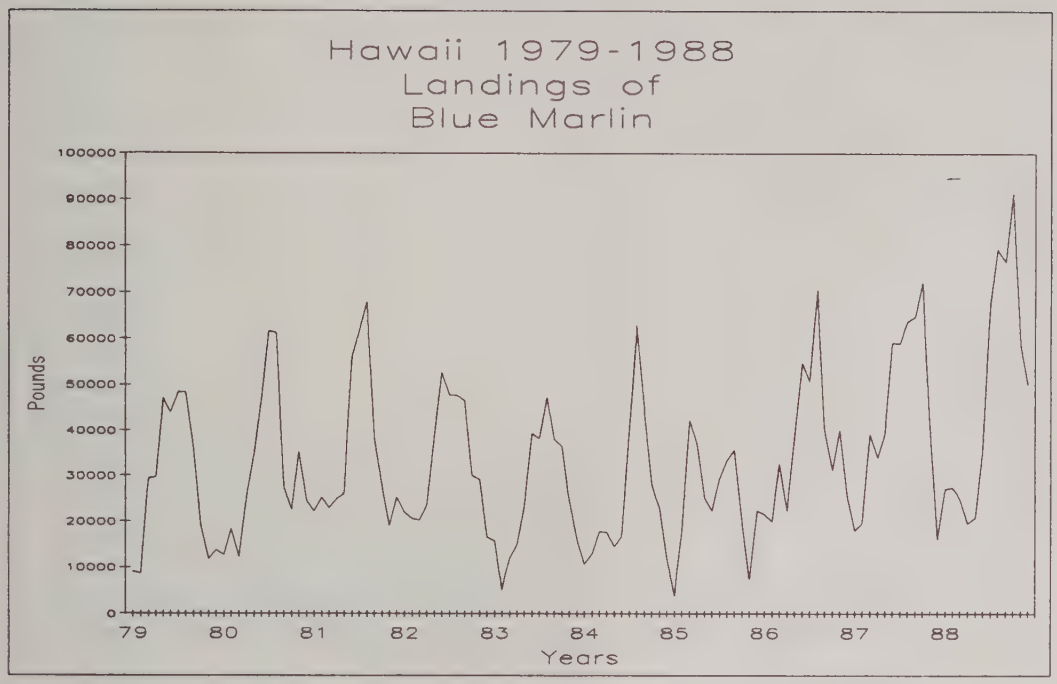

Figure V.4.4

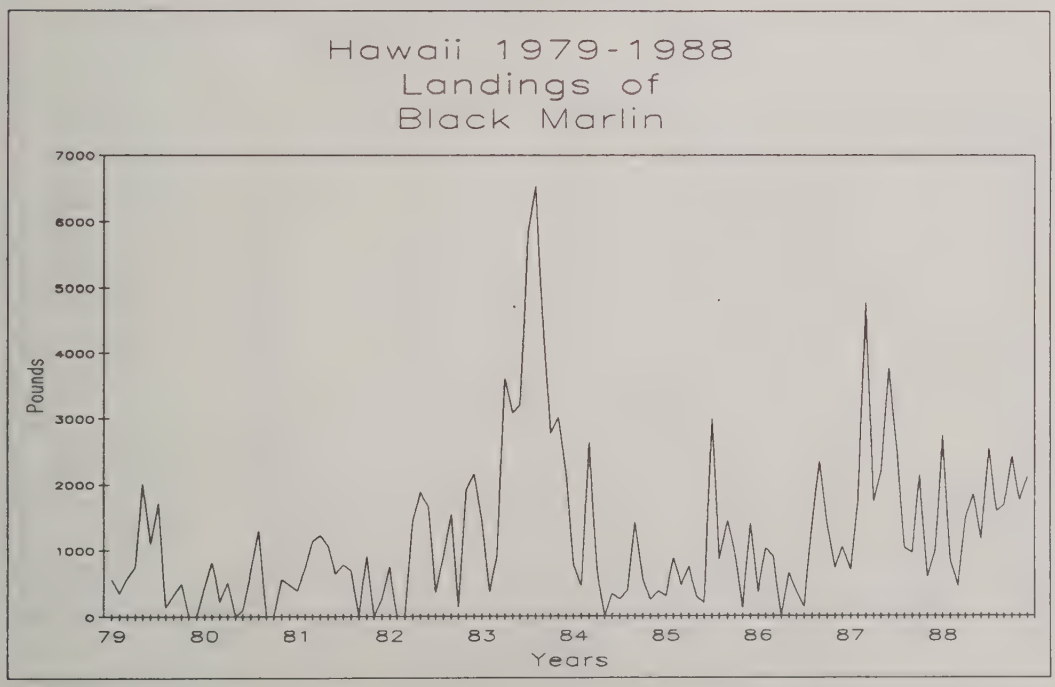

Figure V.4.5

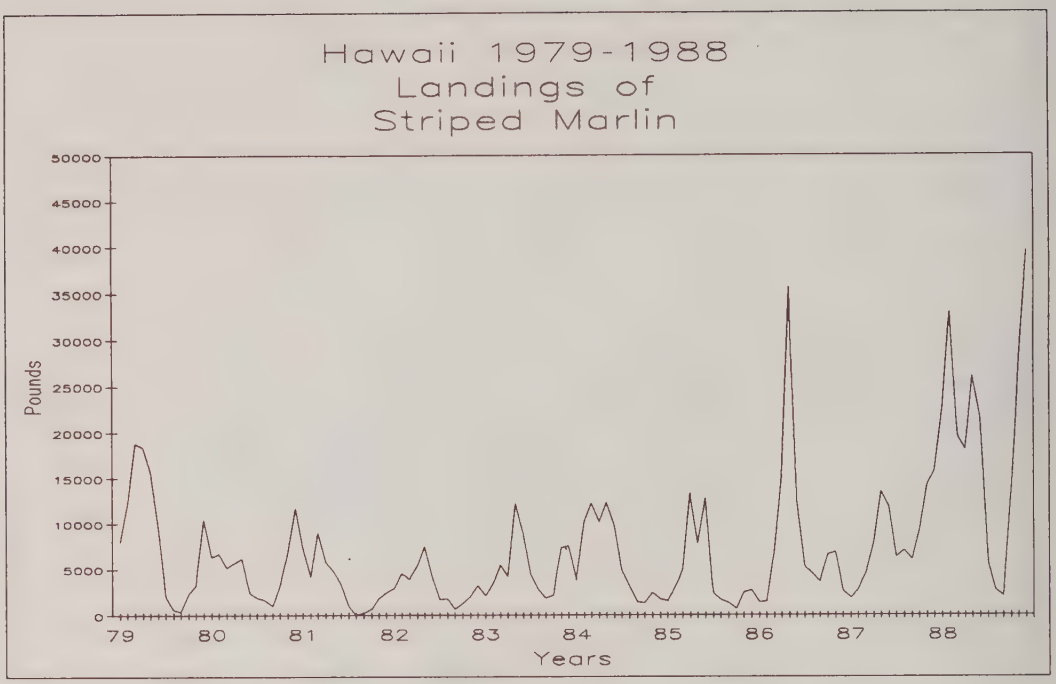

Figure V.4.6

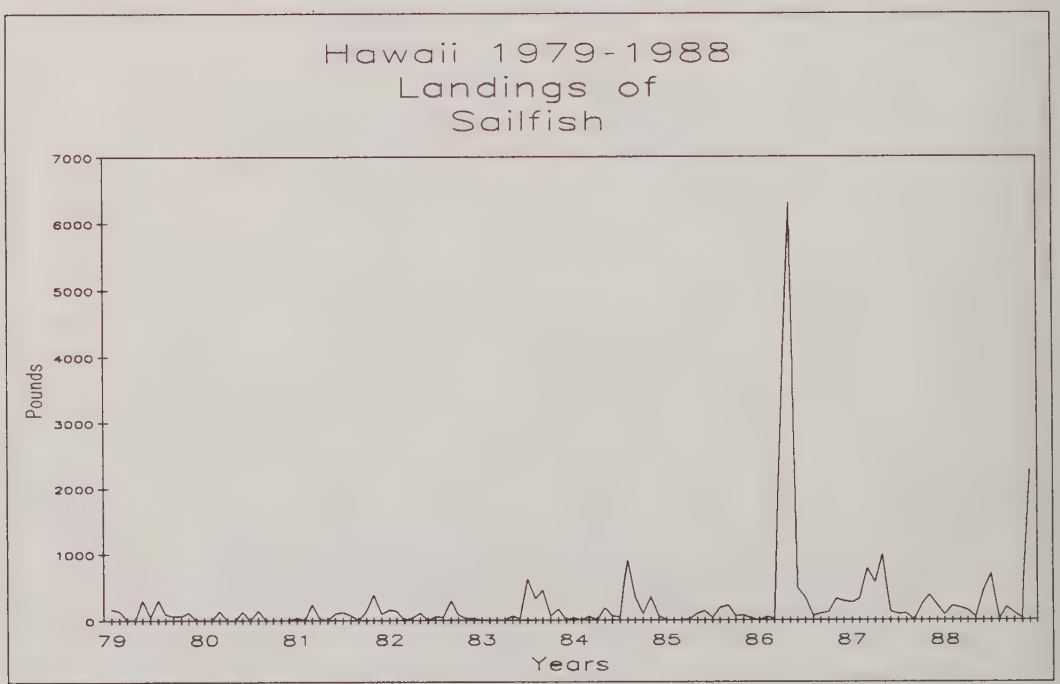

Figure V.4.7

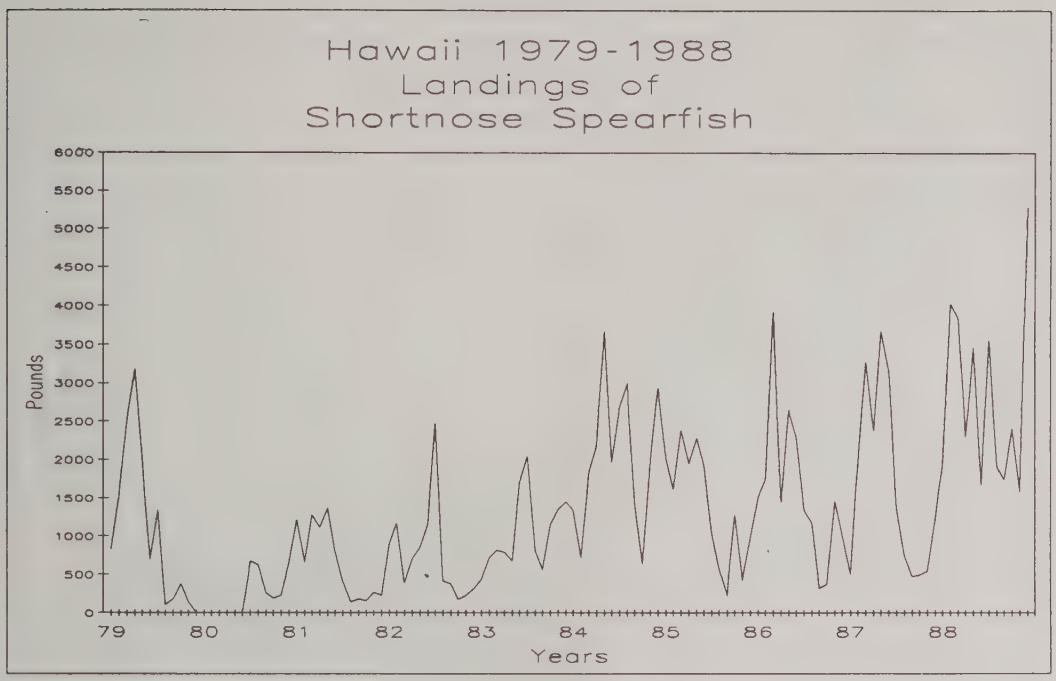

Figure V.4.8

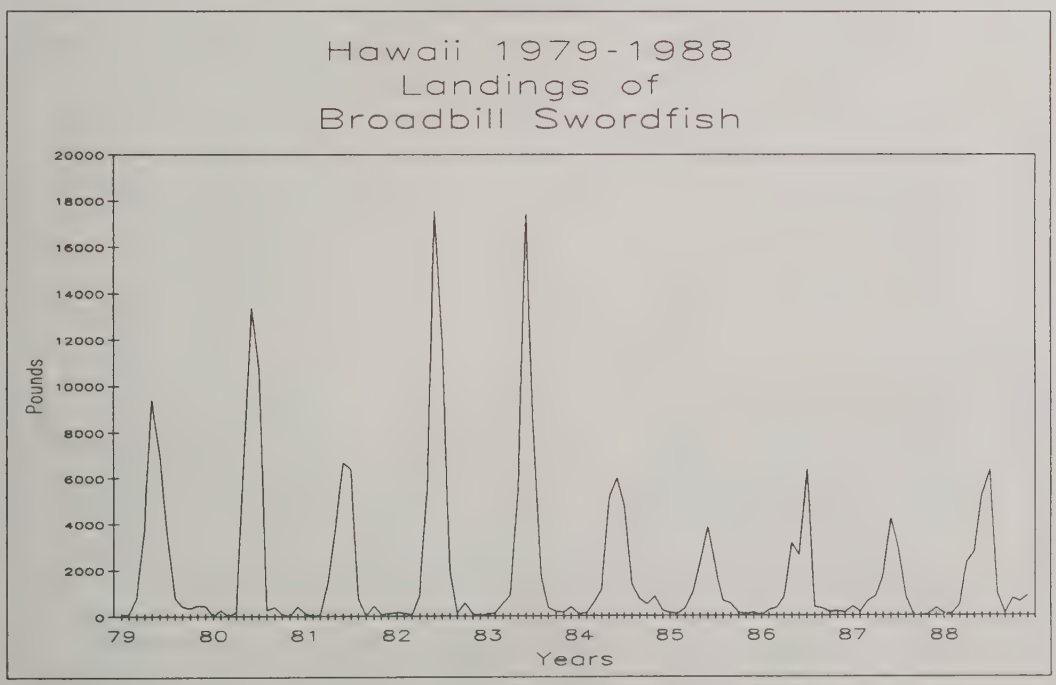

Figure V.4.9

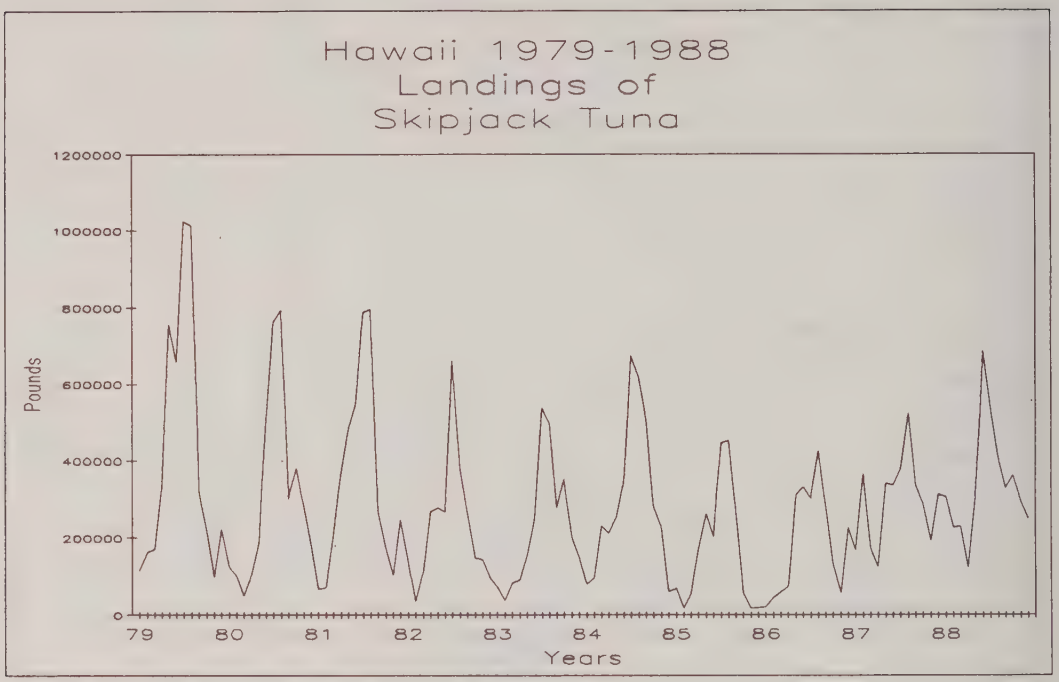

Figure V.4.10

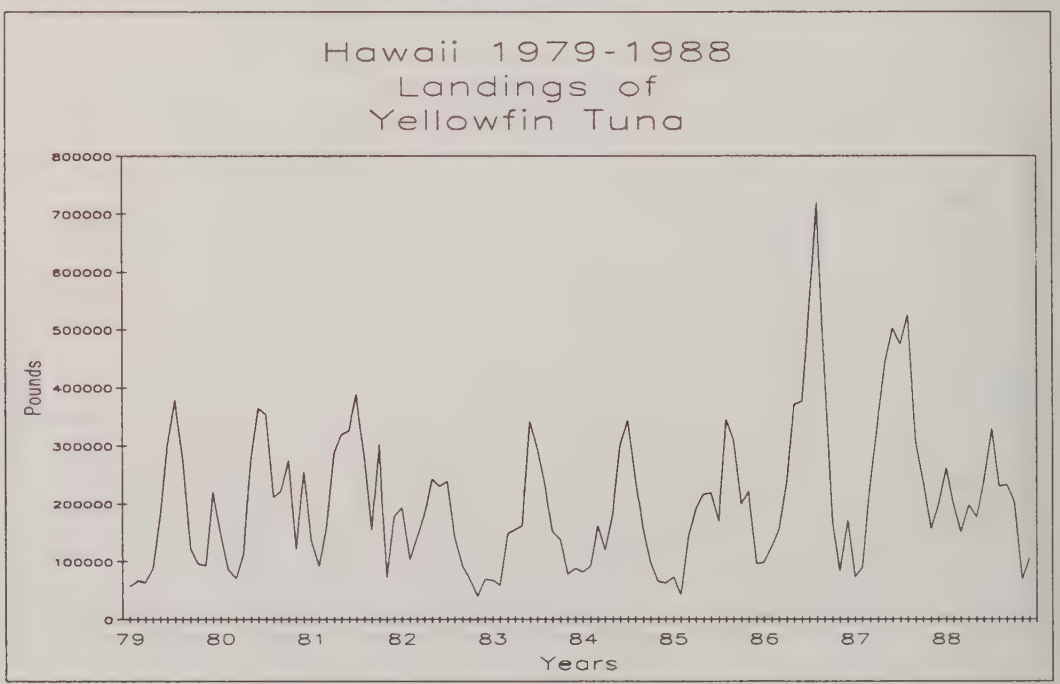

Figure V.4.11

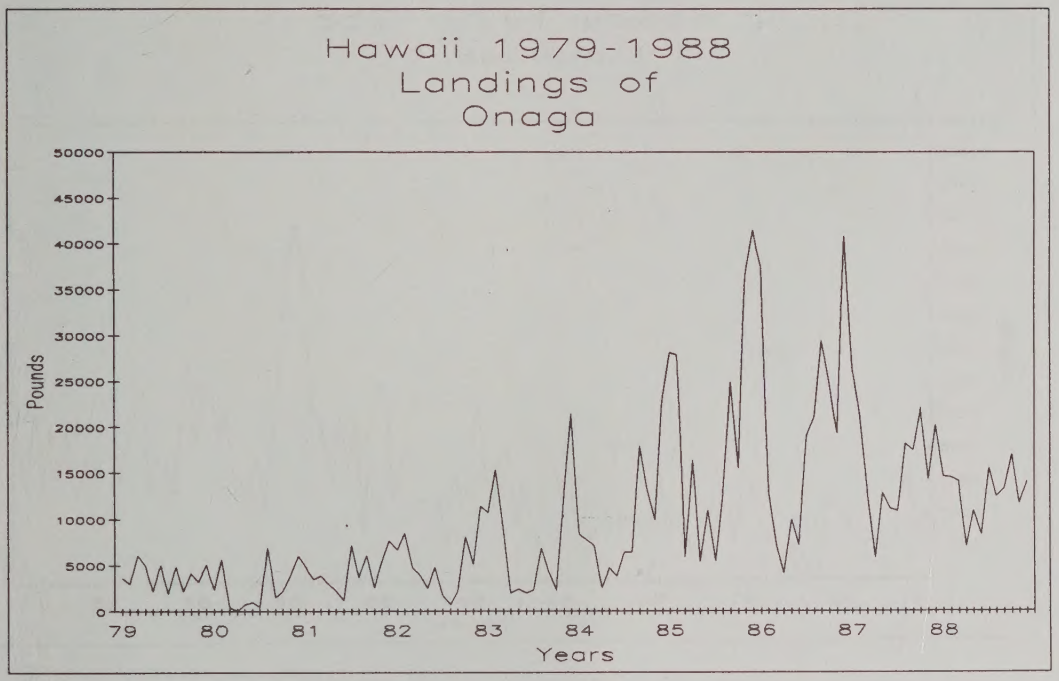

Figure V.4.12

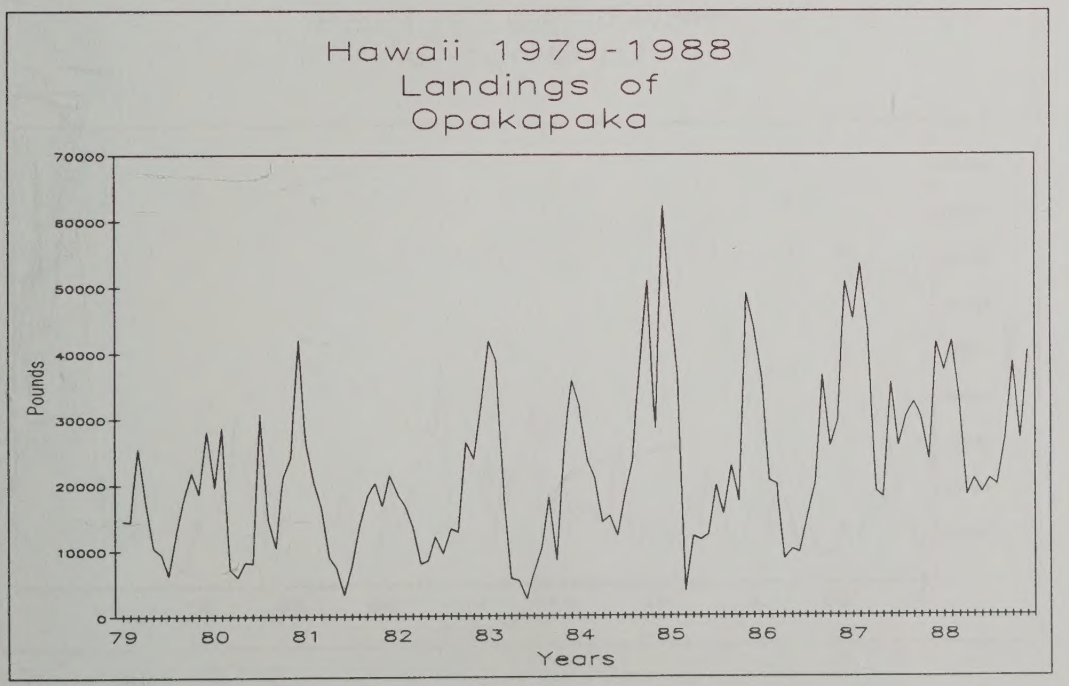

Figure V.4.13

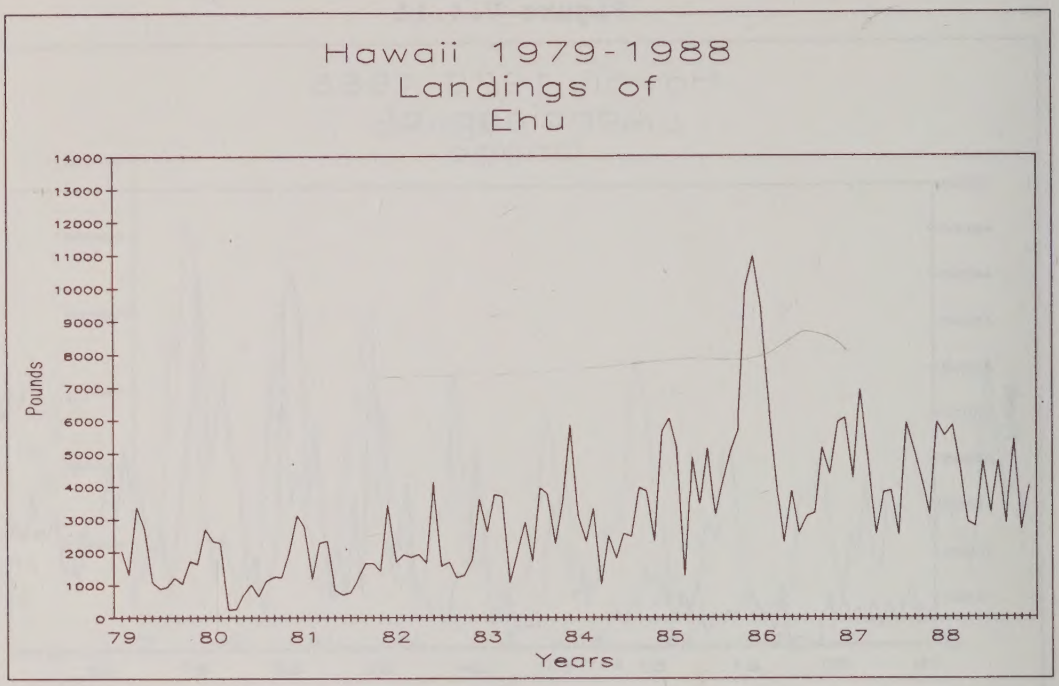

Figure V.4.14